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AIDS EDUCATION FOR MEDICAL TECHNOLOGISTS

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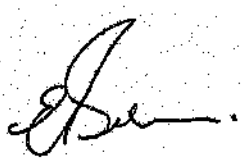
A research report submitted to the Faculty of Science, University of the Witwatersrand, Johannesburg, in part fulfilment of tne requirements for the degree of MASTER OF SCIENCE.

JULY 1993.

DECLARATION

I declare that the work done for this research report is my own. It is being submitted for the degree Master of Science in Science Education to the University of the Witwatersrand. It has not been submitted before for any degree or examination to any other University.



Signature of candidate

30th day of July 1993

ABSTRACT

The epidemic spread of AIDS has focused attention on occupationally acquired HIV infections and although the risk of infection is known to be low, 28 cases of HIV sero-conversion have been documented in health-care workers in the absence of other known risk factors. It is important that medical technologists perceive the relevance of this disease, as the prevention of HIV transmission in the laboratory is reliant upon the continual adherence to laboratory safety precautions. A science education programme was tested on 38 medical technologists who were divided into two groups. The programme aimed to increase the knowledge of the medical technologists about relevant scientific aspects of HIV infection and to stress the importance of laboratory safety. The results showed significant increases in the overall knowledge of the medical technologists in the fields of scientific knowledge, HIV diagnosis and laboratory safety practices. Significant changes in the perception of all the participants occurred in the area of laboratory safety. Perceptual changes, such as a heightened awareness of AIDS and a change in attitude towards people with AIDS, occurred only in Group 1. These results indicate that the programme had increased the knowledge of medical technologists. However there is still room for improvement in certain areas and it is concluded that unless this education is continually reinforced the benefits will not be sustained.

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1. INTRODUCTION

Acquired Immunodeficiency Syndrome (AIDS) is undoubtedly the most formidable public health peril faced by mankind this century (Schoub 1990), and despite ten years of intensive research the spread of the virus that causes AIDS continues unabated throughout much of the world (Anderson and May 1992). Massive public education campaigns to decrease adolescent high-risk behaviour have been suggested by experts as a preventative measure (Brown et al 1991).

AIDS is a fatal disease which Sher (1988) describes as "a syndrome of opportunistic diseases, infections and certain cancers occurring in people with acquired immunodeficiency following infection with the Human Immunodeficiency Virus (HIV)". It was first recognized in 1981 in homosexual men in the United States (Brown 1992a), but tests done on stored samples of blood showed that the virus has been infecting humans since the 1960's (Dunlop 1991).

1.1 The extent of the epidemic

Currently the reported incidence of AIDS cases is estimated to be two million (Merson 1993), while the World Health Organization (Jasny 1993) estimates that thirteen million people are infected with HIV and that this number may triple by the year 2000 (Fig 1.1). However when quoting these

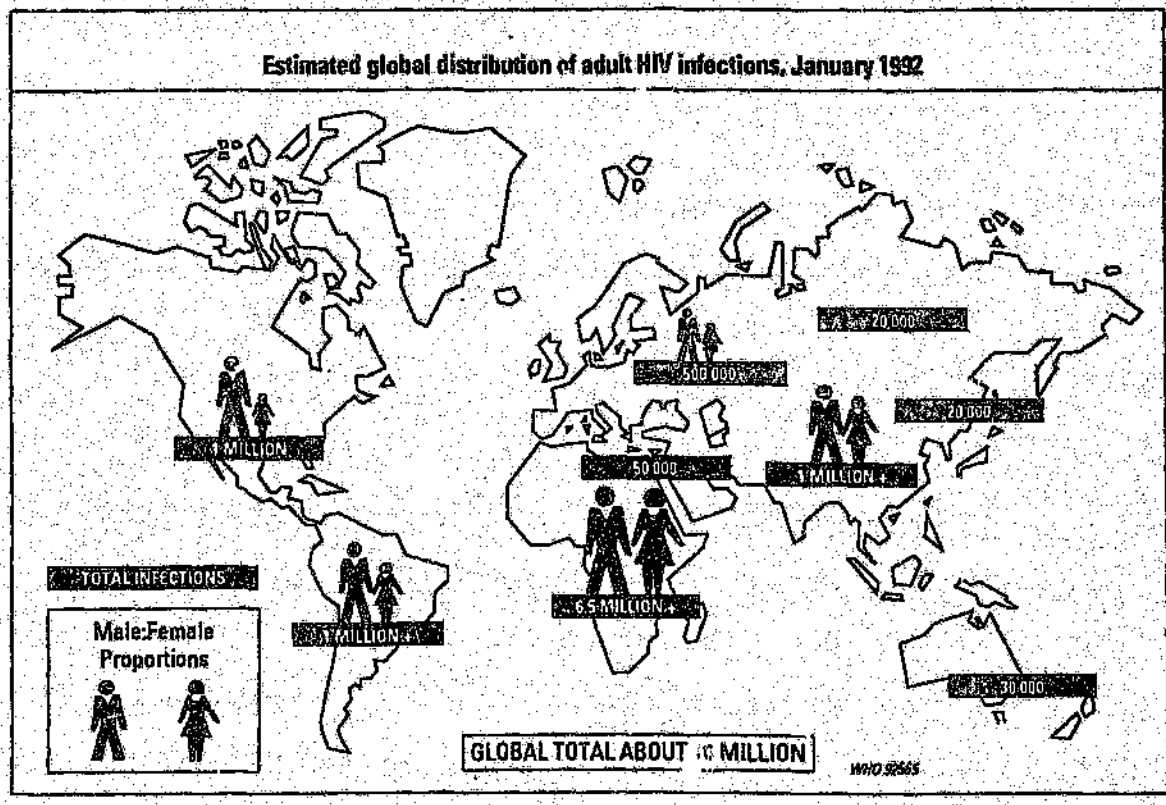


Fig 1.1.

Estimated global distribution of adult HIV infections, January 1992

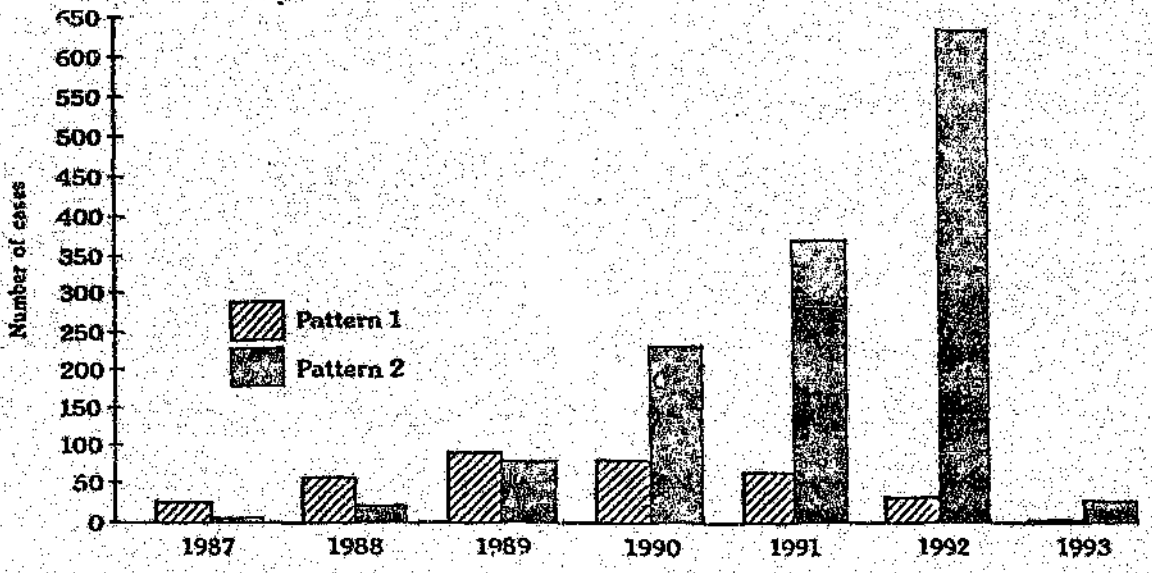
figures it should be borne in mind that while AIDS reporting in the United States is relatively complete, capturing an estimated 70-90% of deaths related to HIV infection, the WHO estimates that not more than 10% of AIDS cases in Africa are reported, although this region includes some of the most heavily infected countries in the world (De Cock 1991). Also countries do not report the numbers of children with HIV infection or AIDS. The World Health Organization (WHO) (1992) estimated that, worldwide, HIV-infected women have delivered close to a million HIV-infected babies, and almost two million uninfected children. All these children, 90% of whom are in Africa, are already or will become orphaned.

Mathematical models reveal a pattern in which the number of people infected with HIV increases exponentially with time. Anderson and May (1992) believe that these models have an important role to play in convincing governments to act now rather than later, as changes made early in the course of the epidemic will have a greater effect than similar changes introduced later. In both Africa and Asia the extent of the epidemic in the general population is creating concern as it is predicted that 40 million people will be infected by the end of this decade (Culliton 1991). Most of these people will be young men and women in their 20's and 30's, whose deaths in huge numbers will devastate the population. WHO Chief, Hiroshi Nakajima, has warned that the looming pandemic threatens the socio-economic development and the survival of whole communities and countries (Culliton 1991).

1.2 The AIDS epidemic in Africa

While AIDS was first recognised in the USA in 1981, it was not described in black Africans until 1983 (Serwadda and Katongole-Mbidde 1990; Saunders and Sambo 1991). Anderson and May (1992) predict that the balance of reported cases will shift rapidly from a majority in the western world, largely the USA, to a majority in the developing world. They state that in many developed countries HIV infection in male homosexuals has reached its peak; a second epidemic in intravenous (IV) drug users has not yet peaked, and a third wave in heterosexuals is only just beginning. In developing countries, especially in sub-Saharan Africa, where homosexual and IV drug abuse activities were never predominant, the early peak which occurred in female prostitutes is now being overtaken by a more widely disseminated infection in the general heterosexual population (Fig 1.2a).

In the worst afflicted urban centres in Africa, 20-30% of pregnant women are infected with HIV (Anderson and May 1992). These women are usually well at the time they become pregnant and are often unaware of being infected. This situation is compounded as the HIV infected women who become pregnant are more likely to develop AIDS, because pregnancy itself induces a temporary state of mild immunosuppression (Allan 1991). In developed countries roughly 13-30% of babies born to HIV infected mothers acquire the infection; in Africa this



Source: Information released by the Department of National Health and Population Development, based on anonymous data supplied by the SAIMR

AIDS cases - pattern of transmission per year since 1987

Fig 1.2a

* Pattern 1: HIV infection in homosexual or bisexual males, and intravenous drug users;
Pattern 2: HIV infection in heterosexual population.

number is closer to 40%. Most children born with HIV will die from AIDS by three years of age (Evian 1991).
Traditional healers may also spread the infection if they use unsterilized blades that were used previously on HIV infected persons (Allan 1991).

In South Africa scientific studies have established that approximately one percent of the adult sexually active population is HIV positive (Evian 1991). Schoub (1992b) calculated that there were 122 951 HIV infected individuals in South Africa as at January 1991 (Table 1.2). Of these individuals, 69% were from the urban black population, 20% from the rural black population, while male homosexuals comprised only seven percent of the total. If the rate of infection doubles every 9 - 11 months, by 1993 Evian (1991) estimates there will be 500 000 HIV infected persons in South Africa.
Peter Doyle, a Cape Town actuary, developed a computer model for South Africa based on the localized geographical area of Soweto (Fig 1.2b)(Robbins 1993). Extrapolating from this model it is estimated that by 2010, 24% of Soweto's population will be HIV positive unless there are timeous interventions and significant changes in behaviour.

TABLE 1.2

ESTIMATED TOTAL NUMBER OF HIV-INFECTED PERSONS IN SOUTH AFRICA AS AT JANUARY 1991

	MEN	WOMEN	TOTAL
White	8863	1543	10406
Black	40900	68821	109721
Coloured	1140	1228	2368
Asian	196	260	456
TOTAL			122951

(Schoub 1992b)

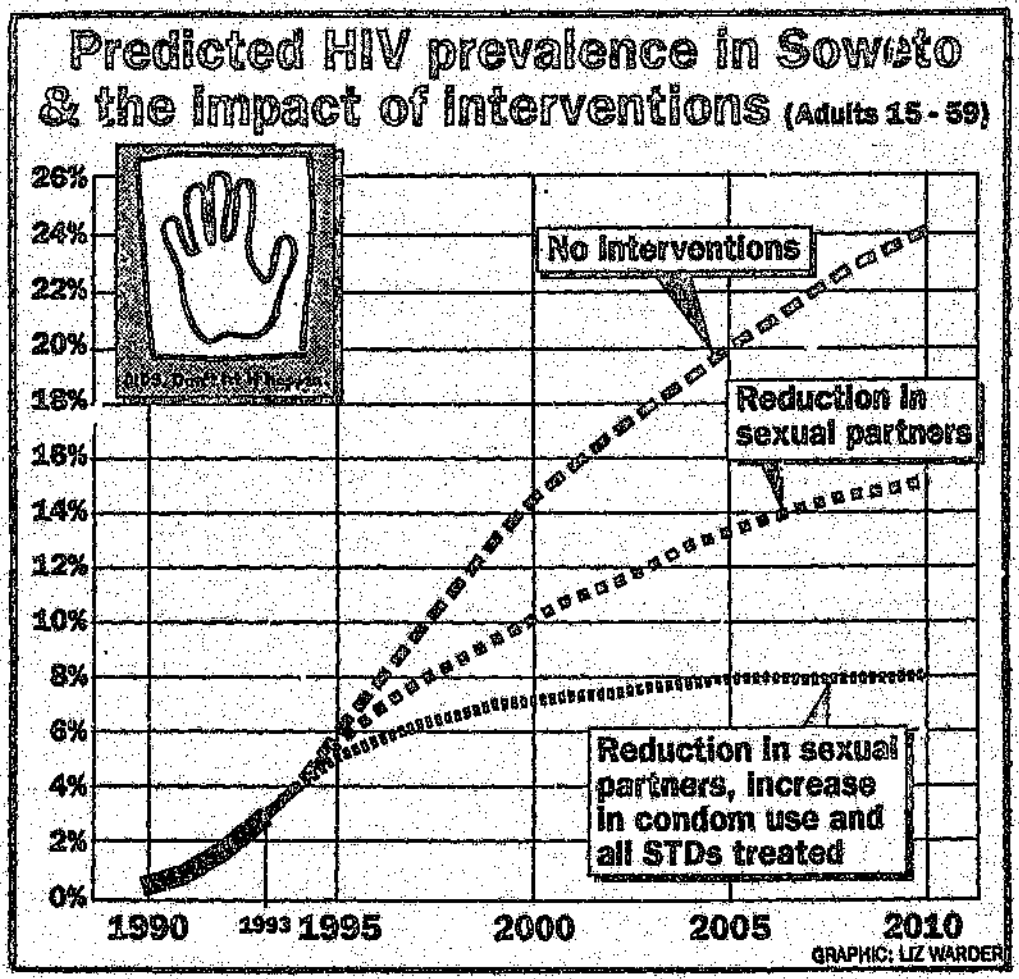


Fig 1.2b

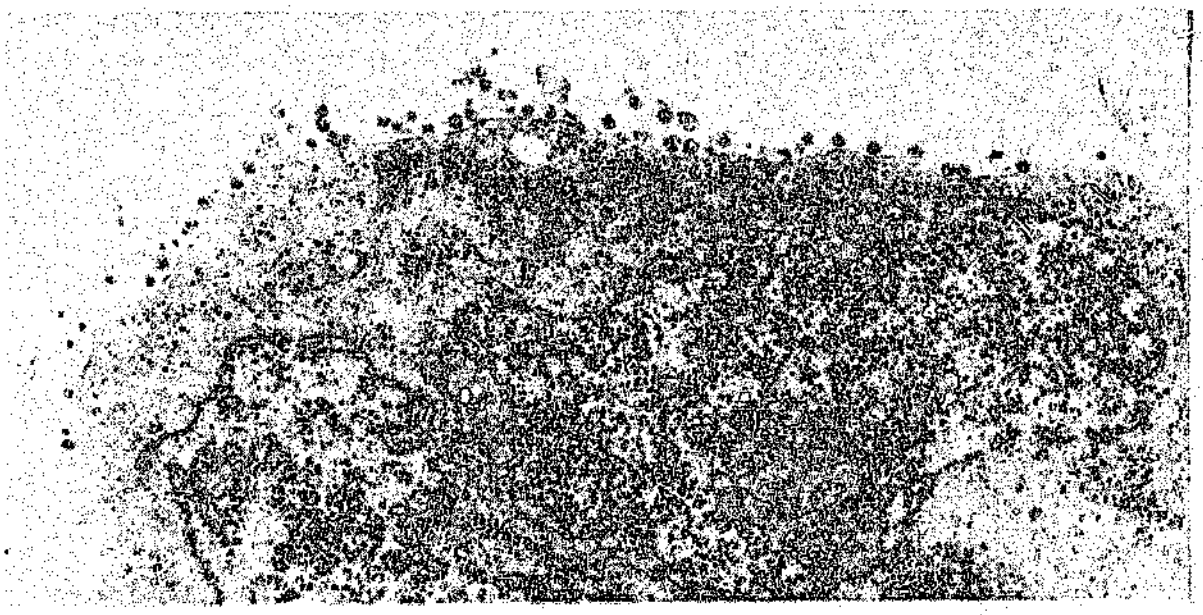
THE DOYLE MODEL

1.3 The Causative Agent

The disease, AIDS, occurs as a result of infection with the virus, HIV (Fig 1.3). This virus was first identified in 1983 by Luc Montagnier, and shown to belong to the family Retroviridae (Gallo and Montagnier 1988). These viruses are exceptional in that while the genetic material is in the form of ribonucleic acid (RNA) they contain a unique enzyme, reverse transcriptase (RT), which enables the viral RNA to transcribe deoxyribonucleic acid (DNA). The newly synthesized "proviral" DNA then integrates itself into the host cell genome to become a genetic parasite.

A decade ago it was widely held that epidemic diseases, such as smallpox, polio and plague, were phenomena of the past. Vaccines and antibiotics, it was thought, would control infectious disease. At that time retroviruses, although known to cause cancer in animals, were not linked to disease in humans (Schoub 1992a). Today it is realized that retroviruses are the causative agents of several human diseases (Table 1.3).

There are still some who doubt the role of HIV in AIDS. The views of Peter Duesberg, a virologist from the University of California, Berkeley, USA, who claims that HIV is a harmless passenger virus which is neither sufficient nor necessary to cause AIDS, have been given much prominence lately.



a.

b.

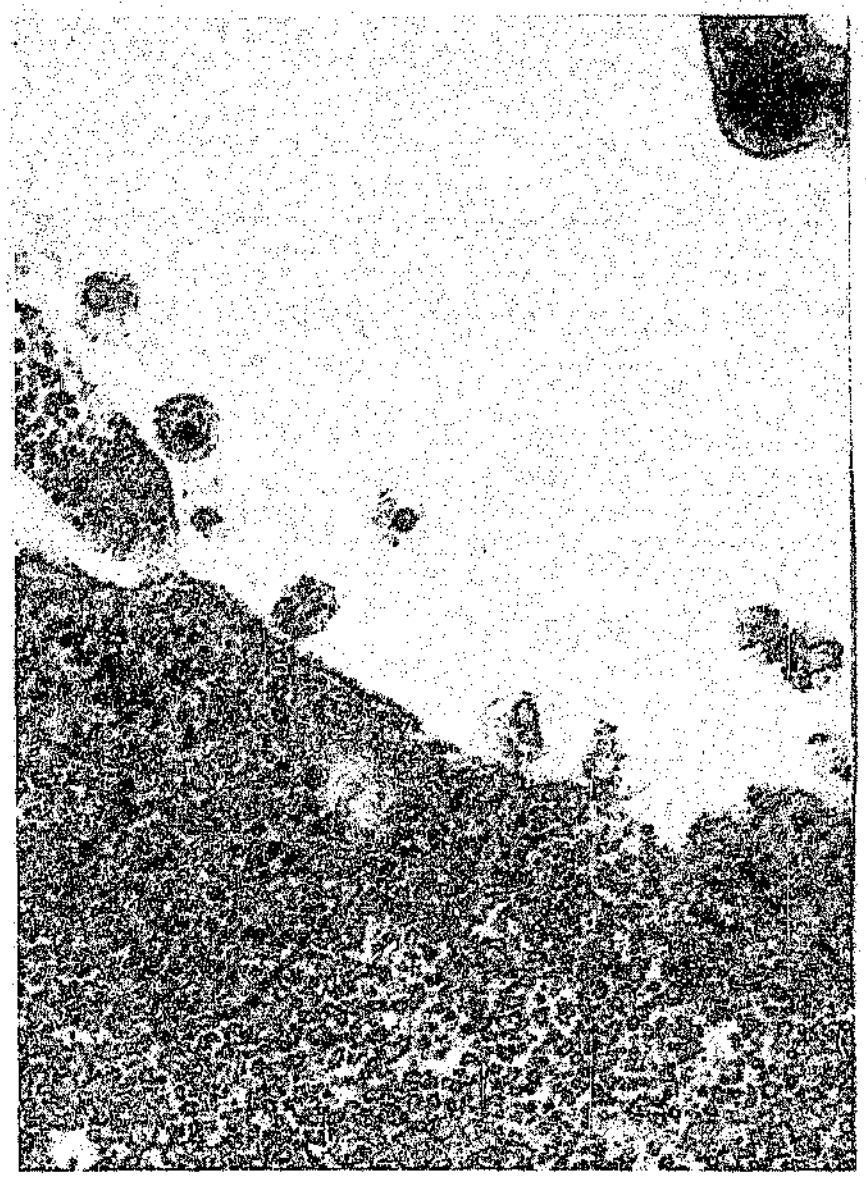


Fig 1.3.

Electron micrograph of HIV particles budding from cell membrane.

Magnification:
a. 15 000 x
b. 40 000 x

TABLE 1.3

HUMAN RETROVIRUSES AND THEIR ASSOCIATED DISEASES

HTLV-1 Human T cell lymphotropic virus-1
. Adult T cell leukaemia, and
. Tropical spastic paraparesis [TSP], also termed
. HTLV-associated myelopathy [HAM].

HTLV-2 Human T cell lymphotrophic virus-2
. Hairy cell leukaemia, and possibly
. Adult T cell leukaemia and TSP

HIV-1 Human Immunodeficiency Virus-1
formerly known as HTLV-3 or LAV-1
. Acquired Immunodeficiency Syndrome (AIDS)

HIV-2 Human Immunodeficiency Virus-2
formerly known as HTLV-4 or LAV-2
. Acquired Immunodeficiency Syndrome (AIDS).

HTLV-5 Human T cell lymphotropic virus-5
. Mycosis fungoides.

Most scientists have refuted his claims convincingly, and the finding that a purified cloned version of Simian Immunodeficiency Virus (SIV), HIV's closest relative, causes an immune deficiency in laboratory monkeys points powerfully towards HIV as being the etiological agent of AIDS in humans (Brown 1992b). However, scientists agree that there are still huge gaps in our knowledge about how HIV causes the collapse of the immune system.

Theories on the origins of HIV range from the bizarre, such as that it came from outer space or is the product of biological warfare; to the more plausible explanations, such as that the virus "jumped" species from another animal to humans a few decades ago, or that it has been around in humans for centuries but in isolated populations (Brown 1992a; McClure 1990). A further theory postulates that live attenuated poliovirus vaccines which were produced in monkey kidney cells, could have been contaminated with HIV (Lecatsas and Alexander 1989; Kyle 1992).

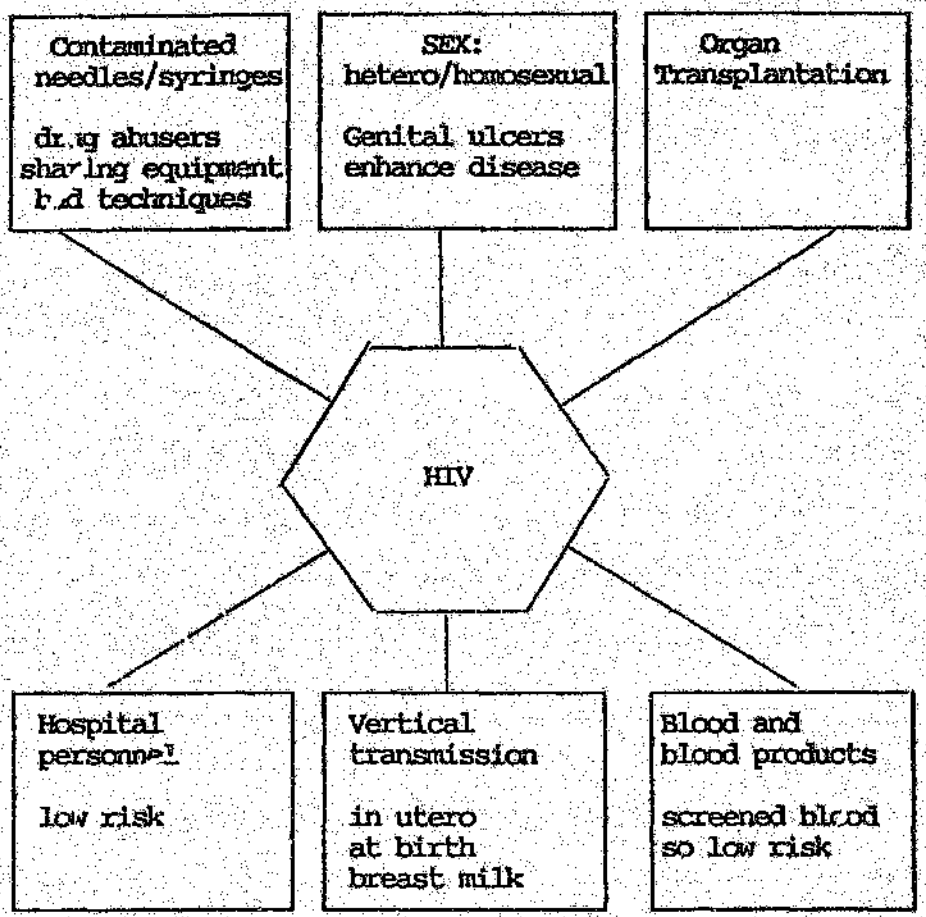
1.4 Transmission of HIV

During the past decade many researchers have emphasized that HIV infection is difficult to transmit, and is mainly confined to male homosexuals or IV drug users. This scenario is not true for Africa or Asia; here the virus spreads with apparent ease from man to woman and woman to man (Culliton 1991). However, when compared to most other

infectious agents, HIV is relatively difficult to transmit, and people can protect themselves if they know how the virus is spread.

The virus is spread in three main ways (Fig 1.4); through sexual contact, parenterally via blood and blood products, and vertically from mother to child (Evian 1991). The most common mode of transmission is through sexual intercourse. Also concurrent sexually transmitted diseases (STD), such as gonorrhoea and syphilis, may enhance the likelihood of HIV transmission, presumably through the genital lesions that STDs cause (Anderson and May 1992). Parenteral spread may occur during blood transfusions, via blood products, or by sharing contaminated needles; while vertical spread from mother to infant may occur before or during birth (Brown 1992a).

While the virus has been found in saliva there is no evidence that kissing has ever infected anyone (Brown 1992a). However cuts or sores in the mouth, or bleeding gums could make kissing potentially dangerous. HIV infection cannot be transmitted by mosquitoes, coughing, sneezing, by normal social contact or by the sharing of household utensils (Evian 1991), therefore theoretically, there should be no danger of HIV transmission in the workplace. The occupational risk of HIV infection to health care workers is not considered to be demonstrably higher than that of other potentially lethal infectious diseases such as tuberculosis, meningococcal



NO EVIDENCE		
Insects	Casual/social contact	Sharing eating/ drinking utensils

Fig 1.4

TRANSMISSION ROUTES OF HIV

Wellcome 1991

disease or hepatitis (Schoub 1992a). But as Schoub (1992a) points out, "penetrating injuries by needles and sharp instruments do constitute a real risk of infection to health care workers (HCW) and this mandates the rigorous adherence to precautions that have been well considered and planned to minimise the risk of infection." The reported incidence of HIV infection following needlestick accidents is low, only 0,4% (Evian 1991c). The spread of HIV through other unlikely means, such as that from physician to patient and vice versa, has been documented; for example, in Florida, a dentist infected at least five of his patients before he died (Shanson et al 1992). The method by which his patients were infected has yet to be determined.

Mets (1991) outlines the procedures to be followed when injuries or accidents occur at work. He states that immediate reporting of the accident is essential. Blood should be taken from the health care worker to establish whether or not s/he had been exposed previously to the virus, then if the source patient proved to be infected with HIV, and the claimant subsequently develops antibodies against HIV within a certain period of time, this would support the assumption that infection occurred as a result of the incident. If this procedure is not followed, claims against workmen's compensation may not be upheld.

1.5 AIDS: The disease and its epidemiology

The HIV virus infects and eventually destroys the cells of the immune system, the very cells that should defend the body against the virus. These cells include the T-helper lymphocytes, as well as monocytes, macrophages and dendritic cells (Brown 1992). Three to six weeks after infection an acute mononucleosis-like syndrome develops which resolves within a few days (Pantaleo et al 1993). Thereafter a long silent phase occurs which may last for five to ten years. During this silent period while there is a gradual deterioration of the immune system, the infected person may look and feel healthy, yet be capable of spreading the disease to others (Evian 1991).

In the early stages of infection there is generally a short period during which free virus may be present in the plasma. This coincides with the so-called "window" period, a period during which the HIV infected person is infectious, but has, as yet, not developed detectable antibodies. Later following the development of antibodies or seroconversion, which normally occurs within one week to three months after infection, no free virus can be detected in the plasma. Recent studies by Pantaleo et al (1993) have shown that although the clinical course may be characterized by a prolonged period of latency, after primary infection the virus continues to replicate at high levels in the lymphoid organs which are probably the major reservoirs of the virus,

as well as the sites of viral replication. The mechanisms whereby individual T-helper lymphocytes are depleted are not entirely clear. Direct or indirect cytopathic processes, apoptosis and immune overload are some of the explanations put forward; also it is suspected that other infections, such as herpesvirus infections, may activate the virus (Brown 1992a). Once the immune system collapses, the body succumbs to the overwhelming opportunistic infections which signal the start of the disease of AIDS. Symptoms may include pneumonia, weight loss, diarrhoea and infections of the brain and eyes (Sansonetti 1989).

Fineberg (1988) describes AIDS as "...a modern affliction...fomented by changes in social mores --- lifestyles that are unique to the latter part of the 20th century: urbanization in Africa, gay consciousness and liberation in the US, development of technologies for the preservation and shipment of blood-clotting factors for haemophiliacs, and modern air travel".
Initially three global patterns were described:-
(Fineberg 1988; Vener and Krupka 1990)

Pattern 1 predominates in the western industrial countries, and affects mainly homosexual or bisexual males and intravenous drug users. In this pattern the male to female ratio is 10:1.

Pattern 2 is the typical pattern found in sub-Saharan Africa, some countries of Latin America and the Caribbean.

In this pattern spread occurs horizontally among heterosexuals, with a male to female ratio of 1:1; as well as vertically from mother to child.

Pattern 3 was the pattern initially seen in Eastern Europe, North Africa, the Middle East and Asia. Here the small number of cases originally reported occurred when travellers from these areas had sexual relationships with HIV carriers in other parts of the world. However this latter pattern is swiftly changing, especially in countries such as India and Thailand where the AIDS epidemic now resembles that found in Africa, with heterosexual transmission playing the most important role (Gorman 1992).

The description given by these three patterns is simplistic and does not do justice to the complexities of the current epidemic. The identification of high risk groups, such as homosexuals and drug users, is of lesser significance than the identification of high risk behaviour, such as unprotected intercourse or needlesharing, which highlights the fact that it is not who the person is, but what s/he does that puts them at risk for HIV infection.

1.6 AIDS: A Disease without a cure or vaccine

In the past decade scientists have learnt more about HIV than they knew about almost any other disease causing organism; yet enormous questions still remain. In particular, it is not understood exactly how HIV causes disease. This is

hampering the design of drugs and vaccines as, "it is one thing to block the enemy's advances when you know how it operates, but quite another to do so when its strategies are unclear" (Brown 1992a).

The drug, Zidovudine or AZT, does slow the progression to AIDS and in this way may improve the quality of life of those with the disease (Anderson and May 1992). Zidovudine acts by blocking the action of the viral enzyme, reverse transcriptase. The virus is then prevented from replicating in the cell and this slows down the course of the disease for a limited period in those already ill, while delaying the onset of the disease in those who are HIV infected but free from symptoms (Brown 1992a). Unfortunately these benefits do not last indefinitely and eventually the virus mutates to produce strains unaffected by the drug. The drug also can have serious side effects, such as anaemia, which may preclude long term treatment. At GaRankuwa Hospital a limited supply of Zidovudine tablets have been made available to health care workers who are accidentally exposed to HIV infection during work (Crous 1992). Other nucleoside analogues, such as dideoxyadenosine (ddI), are also under investigation, and could be used singly or in combination with AZT.

Optimism concerning the speedy development of a vaccine has waned (Anderson and May 1992). The viral genome not only integrates into the host cell's genetic material, but also

tends to mutate rapidly. Great genetic diversity has been found in the viral isolates obtained, either sequentially from the same patient or from different patients. A successful vaccine preferably should be able to stop the virus before it can infect a single cell (Dunlop 1991) but it is extremely difficult to develop protective vaccines against a virus which constantly presents altered antigens to the immune system. Schoub (1992a) reports that eleven candidate vaccines are currently undergoing trials, and he is optimistic that an effective vaccine may be available before the end of the decade. While a successful AIDS vaccine will be hailed as one of the greatest benefits mankind has ever achieved, it is only the first step towards the global control of HIV infection. The cost and effective distribution of any vaccine will present major difficulties (Dunlop 1991). Its price may put it beyond the reach of most people except for certain groups in developed countries; and the very countries that participated in the trials of the new vaccine may not be able to benefit from its success due to cost.

In the absence of a cure for AIDS and the limited options that exist for treatment, health education remains the only viable hope of reducing the prevalence of AIDS (Nyachuru-Sihlangu and Ndlovu 1992). At present control of the epidemic is based on the premise that the virus is not readily transmissible, and that entrenched behaviour and practices are amenable to modification (Schoub 1992a).

Due to the exponential spread of the epidemic considerable resources should be directed towards inducing behavioural changes now to prevent a widely disseminated and lethal epidemic some ten to twenty years hence. Developing public awareness is seen by some researchers as a high priority (Evian et al 1991) as the general public appears to be largely unaware of or is denying the seriousness of the epidemic. Despite the knowledge that heterosexual HIV infections constitute the major problem in countries to the north of us, many in South Africa are still under the misconception that AIDS is a disease largely confined to homosexuals and IV drug abusers, which may spread via blood or blood products to a few unfortunate recipients of blood transfusions or haemophiliacs (Windsor et al 1992).

Education could also be a key factor in helping people overcome their fears, ignorance and prejudices. Certain governments reacted to the disease by restricting the freedom of people infected with HIV. This has often proved counterproductive as fear of discrimination drove those infected underground and prevented them from coming for treatment or counselling (Anderson and May 1992). An interesting point raised by Schoub (1992a) is that while AIDS awareness in South Africa needs to be increased, education on its own may be insufficient to effect sustained behavioural changes. Other social issues, such as poverty, overcrowding,

migrant labour and the economic dependency of women, need to be addressed in order to allow people to take control of their own lives, as "without the resources and opportunities to implement the requisite changes, knowledge and awareness are ineffective in engineering behavioural changes."

Education campaigns have demonstrated success measurable in terms of behaviour modification, increased condom usage and a decline in other STDs in well-motivated and empowered populations such as the male homosexuals in the USA (Schoub 1992a; Anderson and May 1992; Nyachuru-Shangu and Ndlovu 1992), and also to some extent in African populations, such as in Uganda. Unfortunately similar changes have not been noted in heterosexual populations (Nyachuru-Shangu and Ndlovu 1992); also some reversion to high-risk behaviour is again being observed in San Francisco (Schoub 1992a).

1.7 Laboratory Diagnosis of HIV infection

Accurate testing for HIV infection is important as people who test positive can infect others, also infected individuals may benefit from early detection and treatment. Currently most diagnostic tests rely upon the detection of HIV antibodies in the serum of the infected person (Evian 1991). Antibodies are complex particles produced by the immune system in response to an infecting agent or antigen. Together with other components of the immune system,

antibodies assist in eliminating the infecting agent. Upon recovery, a "memory" of the specific antigen is retained and if reinfection occurs later, these specific antibodies will immediately respond and neutralize the invading agent before it can cause disease. However in the case of HIV infection, the HIV specific antibodies produced are not effective in overcoming the infection or in protecting the individual from the disease (Evian 1991), rather they are used as indicators of infection. Therefore a positive HIV antibody test indicates that the individual has been exposed to and is infected with the HIV virus.

A person should be considered HIV positive only after a blood sample has tested positive in three different tests. These usually include two highly sensitive screening assays and one more specific confirmatory assay (Sloand et al 1991). Whilst a positive result indicates infection with HIV, a negative result is more difficult to interpret. It may indicate that the person has not been infected with the HIV virus. However the HIV specific antibodies can take between three to twelve weeks after infection before they appear in the blood. This period varies from individual to individual and may take even longer, periods of up to five years in some cases have been reported (Evian 1991). It is during this "window" period, when the person is infected with HIV but has not, as yet, produced antibodies, that a negative HIV antibody test may be

recorded. In order to solve the problem posed by the window period, tests have been developed that directly detect HIV viral antigens in the patient's blood (Sloand et al 1991). These can assist in diagnosing the HIV status of babies born of infected mothers. Certain antibodies can cross the placenta from the mother to her unborn child, therefore babies bor to HIV-postive mothers will have high levels of passively acquired maternal antibodies. Additional testing is then required to distinguish whether the baby is infected with HIV or merely exhibiting antibodies acquired from the mother (Allan 1991).

2 AIDS EDUCATION

In the absence of a cure or vaccine against HIV, the extent of the heterosexual epidemic will depend on changing the patterns of heterosexual behaviour (Bury 1991). Teenagers are a key factor in the heterosexual epidemic as adolescence is a time of growth and experimentation, and young people are particularly vulnerable when they are seeking a sexual partner. In Britain, Bury (1991) reports that more teenagers are having sexual intercourse at a younger age than was the practice in the past. It is difficult to assess whether this trend is continuing but recent research in the USA suggests that the proportion of teenagers who are sexually experienced may be declining.

Due to the long incubation period of HIV, teenagers who acquire the infection are unlikely to develop the disease until they are in their twenties; and this will produce the devastating results of AIDS - when young people, especially those with potential who have attained managerial or leadership roles, become ill and die. Their deaths will create a vacuum in our society and may result in the collapse of social, economic and civil structures.

In a study on British teenagers (Bury 1991) it was found that while most young people were reasonably well informed about

HIV infection, they continued to see AIDS as something that happens to other people. She also found that there was a gulf between knowledge and behaviour in that while those with the most knowledge were more likely to change their behaviour, there were many young people who were aware of the risks of acquiring HIV yet continued to behave in ways that would put them at risk. However this perceived lack of relevance may be due, in part, to the type of education or information received. Varied approaches and programmes which target specific groups may have to be used to increase peoples' awareness of the disease and enhance its relevance in their lives. The continuing evaluation of these different educational programmes and approaches is vital as effective and efficient methods of communication must be found and implemented urgently.

2.1 AIDS Education in developed countries

AIDS education programmes often target the general population therefore Kowaleski et al (1991) decided to study freshmen students, mainly young white women, at Bowling Green State University. In a quasi-experimentally designed approach, the authors used a questionnaire to evaluate the relationship between receiving classroom instruction on AIDS and subsequent AIDS awareness and behaviour modification. The AIDS education was presented during one semester and faculty members from many different disciplines were involved in

its teaching. A wide range of topics were addressed which included epidemiology, sociodemographics and risk, ethical issues, care for persons with AIDS, religion and AIDS, public policy and legal aspects of AIDS, biology, immunology, symptomology and current treatment approaches, safer sex, negotiating dating behaviour, HIV testing sites, and support systems. Primarily the course consisted of lectures, but participative teaching methods, such as role plays and discussions, were included to assist the students assess low- and high-risk sexual behaviours which would enable them to make informed decisions about their own sexual behaviour. Also during the course, the students met and spoke to persons with AIDS, which would have reinforced the reality of the disease.

Results indicated that both the experimental and control groups had a substantial knowledge of AIDS prior to the study and accepted the current medical theories. It was found that the AIDS education had not altered their perceptions of the disease. Most of the students were sexually active and discussed AIDS with their family and friends which indicated a degree of AIDS awareness. The short time span between the pre- and post-questionnaires made changes in behaviour difficult to monitor but the researchers noted that attitudes towards persons with AIDS became more accepting and positive, and there was widespread opposition to any curtailment of the civil liberties of HIV positive people. These positive attitudes were observed in both the experimental and control groups and, as such, could not have been produced solely by the AIDS curriculum. The only significant finding pertained

to the mandatory testing for AIDS as those who had received the course were significantly more reticent in recommending mandatory AIDS testing.

Vener and Krupka (1990) surveyed undergraduates at Michigan State University in America during 1987, and again in 1989. Using the same 42 item questionnaire in both surveys they found that the students' knowledge of AIDS had increased during the two years. There was also an apparent change in attitude, but while increasing tolerance towards HIV carriers was shown, the students tended to be less willing to associate with these infected carriers in situations of high intimacy. While this enhanced knowledge elevated tolerance and reduced fear, the researchers found that it could increase complacency, as among these college students heterosexual transmission of HIV infection was not seen as a major threat, and relatively few students had changed their sexual habits.

A study by Brown et al (1991) evaluated the impact of a state-mandated educational programme on adolescents from various high schools in the state of Rhode Island, USA. This study which involved largely white middle-class schoolchildren, may not be generalizable to black populations. The AIDS education was designed to increase knowledge, change attitudes and influence future behaviour.

The programme included information about the disease, it's pathology, transmission and prevention, and resources available to the community. Instruction was given over a two to three week period as part of a general health course. Educational strategies used included lectures, discussions, audiovisual presentations, handouts and guest speakers.

A quasi-experimental design was used in which experimental and control groups were chosen on class schedules and not on academic achievement. Similar proportions of race and gender were maintained in both groups. Matched pre- and post-questionnaires were analysed and the standardized change scores, derived from the differences between students' pre and posttest values, were computed. The student t-test was used for item by item analysis for group and time differences. The scale scores were analysed by analysis of variance (ANOVA) to compare group and time effects. The researchers noted that positively worded questionnaire items were endorsed more consistently than negatively worded items and speculated that students may learn to identify the correct pro-social responses while their attitudes remain unchanged. Results indicated that the knowledge of the students had increased. This change in knowledge was greater than the change in attitude and correlated weakly with an increase in tolerance for people with AIDS. Some misconceptions about the disease were dispelled, such as that HIV is transmitted by mosquito bites. However 25-33% of the

students still held erroneous beliefs after education, for example some believed that donating blood puts them at risk of contracting HIV infection. Attitudes changed slightly with students showing more tolerant attitudes towards people with AIDS and towards homosexuals. The education also had some impact on the students' intentions to avoid high-risk behaviour as those students who after education showed more fear of AIDS, anticipated behaving more safely in future. The authors emphasized that the AIDS crisis needs to be seen as relevant by students, but cautioned against using scare tactics as a method of making education emotionally relevant.

2.2 AIDS education in Africa

Following speculation that HIV may have originated in Africa, scientists flocked into Africa to investigate this theory (Serwadda and Katongloe-Mbidde 1990). Many African politicians strongly resented this emphasis with its concurrent sensationalized reporting and, as a result, many countries denied the presence of AIDS within their boundaries. This delayed the start of health education programmes, and this together with the lack of protection against cross infection in hospitals, probably further ensured the spread of the virus. However by 1991 journalists in Tanzania had been trained to communicate accurate information about AIDS through the mass media (Kustner 1991);

in Kenya non-governmental organizations had arranged training courses in AIDS awareness for women's leaders, health workers and church leaders, and in Uganda, Rwanda and Burundi, school health education courses were revised to include AIDS awareness and prevention.

Nyachuru-Sihlangu and Ndlovu (1992) evaluated the results of various governmental and non-governmental AIDS educational strategies in Zimbabwe by testing 478 high school students. They used a comprehensive questionnaire which dealt with knowledge, attitudes and practices. The students' factual knowledge was found to be between 50 to 80% accurate. Most students knew that HIV is not transmitted during non-sexual social interactions, such as holding hands, sharing utensils or sleeping in the same room as HIV-infected persons. Unexpectedly, they found that more boys [27%] than girls [21%] thought about HIV infection when on a date. They wondered if this was because the boys have more sexual partners than the girls; also the girls tended to believe that they were the only ones their boyfriends were dating. Most of the students were not concerned about HIV infection as yet, and continued to favour dating relationships with sexual involvement. Only a small percentage thought that their present partner could possibly be infected with HIV, which suggests that those who are sexually active are probably practicing unprotected sex. This continued high

risk behaviour is worrying. The schoolteachers generally were reluctant and unprepared to discuss AIDS with the students, rather the teachers hoped that the students would read the information books and leaflets placed in the reading rooms and libraries.

2.3 AIDS education in South Africa

In South Africa the major growth point of the epidemic is predominantly in the black urban heterosexual population (Schoub 1990). Whilst the presence of AIDS in South Africa was not denied, education programmes and strategies for AIDS prevention were slow in starting. Schoub (1990) called for the unrestricted commitment and cooperation of all sectors in this country in implementing and supporting educational efforts aimed at reducing HIV transmission. During 1991 the AIDS Unit was formed within the Department of National Health and Population Development with the aim of changing behaviour patterns and attitudes towards AIDS through education (AIDS Unit communication 1991). Public information campaigns were launched using TV, radio and the news media, and local authorities such as the Johannesburg City Health department used city buses to convey simple and brief health related messages (Evian et al 1991).

Some formal AIDS educational programmes have recently been introduced into South African state schools. Matthews et al (1990) in an attempt to obtain baseline information which would assist in the planning of appropriate AIDS education for schools, used a questionnaire to survey the knowledge, attitudes and practices of 377 students. The students, who were selected from four Cape Town township high schools administered by the Department of Education and Training (DET), ranged in age from 13 to 26 years with a median of 17 years. Most of the students were sexually active and had heard of AIDS, but there was a disturbing lack of knowledge about the transmission and pathogenesis of this disease. Most of them correctly stated that AIDS could be transmitted through sexual encounters, but this was often associated in their perception with promiscuous behaviour, prostitutes or whites. They did not perceive AIDS as an immediate threat to themselves nor as a problem within their townships. Their knowledge of other routes of HIV transmission was poor to non-existent. More than half the students did not realize that HIV-infected persons could appear healthy, and many did not know that AIDS can not be cured. In fact the belief that AIDS can be cured, either by conventional or traditional healers, has been found to constitute a serious barrier to effective education.

The students expressed concern about dying or being stigmatized if they were infected with HIV, and these fears

were reflected in their unwillingness to accept a person with AIDS into their class. Virtually all the students indicated that they were in favour of AIDS education at school but requested that it be taught by the school nurse rather than the class teacher.

Based on these results Matthews et al (1990) highlighted some key aspects for consideration when planning AIDS educational programmes:-

firstly, AIDS is often seen as another group's problem. Therefore education is needed which is non-racial and does not stigmatize minority groups such as homosexuals; the students "need to feel a personal vulnerability to the disease" before behavioural changes will occur;

secondly, if the disease is not seen as a personal threat there may be a reluctance to associate with HIV-infected persons. Education must encourage a non-discriminatory attitude towards those infected with HIV as "an important motivation for behaviour change is a feeling of compassion for those already infected;"

thirdly, AIDS education should be provided at primary school level, before the children become sexually active. Matthew et al (1990) found that most of the high school students were already sexually active and are therefore at risk as, although physically mature, they do not necessarily have an adaquate knowledge about sex, or of how to protect themselves against disease.

In South Africa many people are illiterate or inadequately literate In 1986 French, of the Human Sciences Research Council (HRSC), stated that there were between four and nine million illiterate or inadequately literate people in South Africa (personal communication). Although the proportion of illiterates in the population is decreasing, the absolute number is probably increasing. Therefore it is important that AIDS intervention strategies also concentrate on communication skills. Karim et al (1991) found after questioning 122 black mothers of urban teenagers, that although the level of AIDS knowledge among these women was high, none used condoms, and most of them had not spoken to their teenage children about safe sex practices. AIDS education programmes, besides transmitting information should also help the participants acquire the necessary communication skills so that they can negotiate safe sex practices with their partners and discuss the risks of HIV infection with their teenage children.

AIDS education programmes have sought to inform people about the transmission of HIV infection and its social implications. Govender et al (1992) questioned the current knowledge, attitudes and practices of 50 randomly selected black women, aged between 20 and 29 years, who were attending a family planning clinic in Johannesburg. They found that

while most of the women were aware of AIDS, only about half of them cited sexual intercourse as a mode of transmission. They identified many misconceptions regarding the transmission of HIV, these included donating blood, the use of toilets, sharing of clothes and utensils, and insect bites. These women were sexually active, yet none used condoms, and only just over half of them perceived themselves as being at risk of contracting HIV. The authors conclude that for people to change their lifestyles they need more than facts, they need to experience at a personal level the reality and meaning of AIDS in their own lives.

Programmes designed for specific target groups have been launched, such as those started by companies for their employees. AIDS-SAFE was launched by Chapmar (Digest 1991) and consists of a slide and video presentation tailored to suit all levels of employees.

Thompson (1990) attributed the success of the AIDS education programme for staff members at Unilever, in part, to its informative, rather than prescriptive, presentation. The short video presentations are followed by discussions, and the facts given enabled people to make informed decisions about their own lives, rather than being told what to do. Also the health education service at the firm was well established and the facilitator, a person whose "age is seen to imply knowledge", was known and respected by the workers.

Unfortunately due to the importance and swiftness of the epidemic, AIDS educational programmes are often implemented rapidly, sometimes without careful planning. Studies to assess their effectiveness have been mainly limited to either formative or process evaluation (Padayachee 1991). Outcome evaluation that measures which aspects of the programme have been effective, as well as long-term impact evaluations are necessary as "the key to success in the AIDS prevention programme lies in producing a systematic and trustworthy account of what was attempted and why, to whom and how it was carried out, and finally what was the outcome" (Padayachee 1991).

2.4 AIDS education for medical technologists

The epidemic spread of AIDS has focused attention on occupationally-acquired HIV infections (Wood and Check 1988). Although the risk of infection is known to be low, 28 cases of HIV seroconversion have been documented in health care workers in the absence of other known risk factors (Schoub 1992a). Certain programmes for nurses, paramedicals and those directly involved in patient care have been described. However none have specifically targeted medical technologists, who while not usually having direct contact with patients, handle infectious material from these patients on a daily basis.

Medical Technologists are applied biologists who practise clinical laboratory science (Stanley 1990). Their formal education encompasses the basic sciences, such as chemistry and physics, as well as specific clinical laboratory subjects and techniques (Ehrmeyer and Ehrmeyer 1984). Medical technologists may work as biochemists, cytologists, microbiologists, histologists, immunologists, haemotologists, virologists, or perform some combination of these tasks in the laboratory. They test blood, tissues, urine, and other body fluids to assist the clinician in the diagnosis of disease or to monitor the condition of patients undergoing treatment (Stanley 1990). Besides technical and clinical competence, medical technologists need to be highly responsible as "their careful attention to detail must not falter under the pressure generated by heavy workloads and emergency interruptions" (Stanley 1990). In the laboratory it is essential that medical technologists adhere to the prescribed safety regulations continuously and willingly, and regard all specimens as potentially infectious. Unfortunately this does not always occur, in some instances special precautions may be taken only when specimens are labelled as biohazardous. Medical technologists therefore have specific educational needs. Their occupation causes them to be at risk, and they need the scientific knowledge which will enable them to understand the potential danger and to make informed decisions about their own behaviour, as well as educating others in their communities.

Medical technologists have an educational background which should enable them to understand the scientific principles involved in the pathology of HIV; and if the dangers involved in handling potentially infectious specimens became more relevant to them, this could lead to attitudinal and behavioural changes.

The medical technologists at GaRankuwa Hospital and Medunsa are mainly young adults, most of whom are sexually active. Many are parents and their attitudes will be reflected in those of their children. Also as trained health professionals, they are regarded as knowledgable leaders within their communities and their perceptions of this disease will influence others.

However many of the medical technologists tend to regard the possibility of contracting HIV infection largely as a concern of others. Many perceived AIDS as a white homosexual disease and, as such remote from their experience. Also some medical technologists had read about the controversy surrounding HIV as the causative agent of AIDS. Belief that this virus is not responsible seems to foster a false sense of security in those who wish to relegate AIDS to the status of a myth, a scare tactic or, more sinisterly, to another ploy to limit black population growth by encouraging the use of condoms. These beliefs were repeatedly stated during discussions held with the medical technologists prior to the course. It is

probable that this misconception will only be altered if, through personal experience and involvement, their scientific knowledge about the virus and its pathogenesis is increased. Most studies on AIDS education have found that while general knowledge increased, there was little change in behaviour, and it is evident that people need more than facts about AIDS to convince them to change their lifestyles; they need to experience at a personal level the reality and meaning of AIDS (Govender et al 1992).

When planning this course for the medical technologists certain restrictions had to be considered. Although official permission to run these courses had been granted, the medical technologists were not required to attend them, nor were there any official end-of-the-term examinations to act as a learning stimulus. Therefore other approaches had to be used to encourage those who volunteered for the programme to complete the course and to learn from it.

This freedom of adults to attend or not to attend classes or courses is an important aspect that differentiates the teaching of adults from the teaching of children at school (Rogers 1977). Adults often have more than one motive for joining a class; motives may be vocational, self-developmental, remedial or even social, but in most cases their attendance on the course is voluntary. Education in this context not only concerns the learning of subjects

but also includes the growth and development of the learners. Successful adult education requires that the learners are involved and participate in their learning, that the subject matter is of immediate relevance to them, and that their interest and enthusiasm is stimulated and sustained (Knowles 1983). HIV is the latest, and probably the most newsworthy, in a long line of viruses and other infectious agents to which medical technologists are exposed when working with biological materials. Therefore apart from its own intrinsic interest, the HIV virus provided an excellent vehicle for emphasizing the importance of laboratory safety practices, a life skill which medical technologists must acquire quickly and retain permanently.

2.5 Purpose and aim of this study

Medical technologists have a medically-orientated scientific education, therefore they are capable of understanding some of the scientific complexities of the HIV virus. The hypothesis was that as their scientific knowledge about HIV and its characteristics increased, the potential risk of infection would become more relevant to them. This increase in relevance would parallel an increase in their understanding of the advisability of adhering to the safety regulations in the laboratory which would lead ultimately to attitudinal and behavioural changes.

Therefore the aim of this course was to increase their scientific knowledge about the HIV virus in order to promote an awareness of AIDS which would foster a positive attitude towards the continued practice of laboratory safety procedures.

3 SUBJECTS AND METHODS

3.1 The Participants

Forty-five interested medical technologists volunteered to attend the initial session during which they all completed the pretest, Questionnaire No 1 (Annexure A). These medical technologists were subsequently divided into two groups for the courses. Initially selection for Group 1 or 2 tried to match participants according to rank and department. However a total equalization was not possible due to the work commitments of the medical technologists, all of whom were full-time employees of either GaRankuwa Hospital or Medunsa, and continued with their normal laboratory duties when not participating in the course.

Five participants did not complete the course and two of the more senior medical technologists were excluded from the statistical analysis, therefore 38 matched questionnaires were obtained for analysis.

Group 1 consisted of 18 medical technologists, nine females and nine males. The majority (66%) were between the ages of 20 and 29 years (Fig 3.1), and comprised ten students from the departments of Chemical Pathology, Haematology, Microbiology and Virology; one qualified from Chemical Pathology; two seniors from Haematology and Virology; three principals from Haematology and Microbiology; and two chiefs both of whom were from Microbiology (Table 3.1).

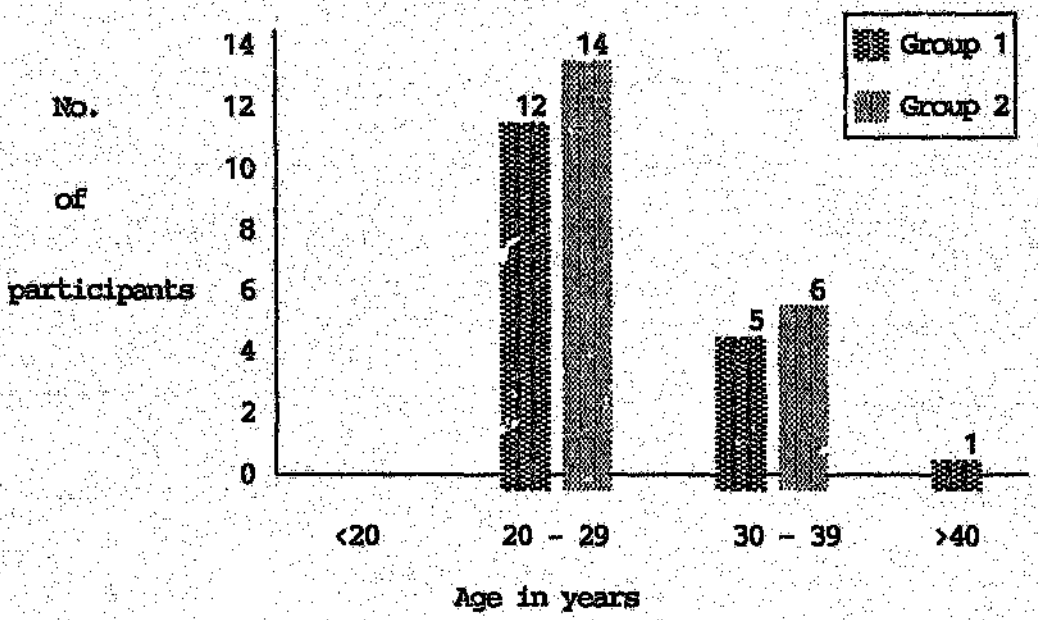


Fig 3.1

AGES OF PARTICIPANTS

TABLE 3.1

NO OF PARTICIPANTS BY RANK, DEPARTMENT AND GROUP

RANK	Anat Path	Chem Path	Haem	Micro	Viro	Total/rank GROUP 1	GROUP 2
Students	0	3	3	7	4	10	7
Qualified	0	4	0	0	1	1	4
Senior	2	0	2	1	2	2	5
Principal	0	1	2	3	0	3	3
Chief	0	1	0	2	0	2	1
Total participants/dept							
GROUP 1	0	4	5	6	3	18	
GROUP 2	2	5	2	7	4		20

Group 2 consisted of 20 medical technologists, six females and 14 males. The majority (70,0%) were between the ages of 20 - 29 years (Fig 3.1), and comprised seven students from Microbiology and Virology; four qualifieds from Chemical Pathology and Virology; five seniors from Anatomical Pathology, Haematology, Microbiology and Virology; three principals from Chemical Pathology, Haematology and Microbiology; and one chief from Chemical Pathology (Table 3.1).

3.2 Methods

Various experimental approaches were considered but due to exigencies pertaining to the unrest situation at GaRankuwa Hospital, approaches incorporating control and experimental groups and/or multiple interventions were not possible. For this project both groups received the same science education package, the first group in July 1992 and the second group in August 1992.

Questionnaire No 1 (Annexure A) was completed during the first session and served as the baseline control. The posttest, Questionnaire No 2 (Annexure B) was completed at the end of each group's final session and the changes in knowledge and perceptions were calculated from these answers.

Permission to run these courses during working hours was obtained from the Chief Medical Superintendent of GaRankuwa Hospital and the Heads of the various Pathology departments.

3.3 The questionnaires

The study instruments were two comprehensive questionnaires (Annexures A & B) which probed the knowledge and perceptions of medical technologists about AIDS and HIV infection. In order to facilitate the quantification of the results both questionnaires contained the same key questions, however certain items from Questionnaire No 1 were omitted in Questionnaire No 2 and others which specifically related to the course were added. The questionnaires contained both closed and open-ended questions. The inclusion of the latter was deemed important as responses in the medical technologists' own words may identify knowledge and perceptions genuinely known or held, rather than nudging them towards the socially-correct attitude or enabling them to identify, or guess the correct knowledge answer.

A statement of confidentiality was incorporated into the introductory portion of both questionnaires and the complete confidentiality of their responses was explained and assured to all the participating medical technologists.

Questionnaire No 1 was piloted on four non-participating medical technologists of differing ranks, sexes and ages to identify and clarify ambiguous questions in an endeavour to improve its reliability.

There were seven demographic questions relating to the age and gender of the participants, the department in which they worked, their rank, marital status, and whether or not they had children. Participants were also asked whether they knew someone who had HIV infection or AIDS as it was felt that personal experience of the disease may influence their perceptions.

The various aspects of knowledge that were tested covered five broad categories:-

[1] scientific knowledge about the HIV virus tested such aspects as the meaning of the abbreviations, AIDS, HIV and ARC [Question 46]; the ability of the virus to infect and replicate in certain body cells and fluids [Questions 20, 45]; the immunological and clinical implications implied by the presence of HIV antibodies [Questions 32, 33, 35]; the presence or absence of similar viruses in other animal species [Question 44] and the origin of the HIV virus [Questions 50, 54];

[2] knowledge about the transmission of HIV infection included the modes or routes of transmission [Questions 14, 18, 19, 28, 41], and risks of infection at work or home [Question 9 in Q1, and Question 8 in Q2]; or through needleprick accidents [Question 28, 53];

[3] knowledge about the clinical and epidemiological aspects of AIDS/HIV infection were probed in [Questions 11, 12, 42, 43 in Q1, and in Questions 10, 11, 42, 43 in Q2].

Other questions inquired about the availability of a cure [Question 22] or vaccine [Question 21];

[4] knowledge about the laboratory diagnosis of AIDS/HIV infection tested knowledge about the tests used for diagnosis in Virology [Questions 31, 55, 57] and in other laboratories [Question 51]; and the distinction between sensitivity and specificity in screening assays [Question 56];

[5] knowledge about laboratory safety procedures [Question 47] examined the participant's knowledge about specimen handling [Questions 23, 24] and disposal [Question 40]; and the procedures that should be followed when accidents occur in the laboratory [Question 52].

The perceptions probed in the questionnaires were divided into four categories:-

[1] an awareness of AIDS which explored how much the participants thought they knew about AIDS/HIV infection [Question 7], and from where they had gleaned their information [Question 27]. The participants were also asked whether they discussed the subject with friends and family [Questions 15, 16], and how they thought AIDS awareness could be increased among medical technologists [Question 29];

[2] the importance of AIDS/HIV infection included questions concerning perceptions of the participants on the seriousness of the HIV epidemic [Questions 10, 17 in Q1, and 9, 17 in Q2], whether special courses for medical technologists were necessary [Question 39], what they wished to know about AIDS/HIV infection and why [Questions 30, 38], and how their new knowledge had affected their way of life [Question 27 in Q2];

[3] attitudes towards persons infected with HIV, whether they be colleagues, friends or family were explored in [Questions 25, 26, 49]

[4] perceptions concerning laboratory safety or risk factors. In this section questions probed whether the participants felt themselves to be at risk at work [Question 9 in Q1, and 8 in Q2]; whether they thought that HIV infection could spread among laboratory staff [Question 13 in Q1, and 12 in Q2]; whether the existing safety precautions in their laboratories were adequate and how these could be improved if necessary [Questions 48, 37, 13];

In the knowledge section responses were scored correct [2 marks], incorrect [0 marks] or, in certain cases, partially correct [1 mark]. Full details of the scoring may be found in Annexure C.

In the perception section the socially-accepted correct responses were scored as above, however many of the items

called for suggestions, opinions and responses which could not be clearly defined as "right" or "wrong". In these cases the responses were grouped under broad headings and each type of response awarded a mark. The detailed marking schedule is tabulated in Annexure D, and the replies of the participants to these open-ended questions may be found in Annexure F.

3.4 The educational programme

The educational programme (Table 3.4) was designed to increase the knowledge of medical technologists about relevant scientific aspects of HIV infection and AIDS. The subject matter was chosen to guide the participants along a specific path, and started with general concepts about viruses, leading eventually to the complex interactions which occur between the HIV virus, the cells of the body and the immune system.

The programme extended over a two week period and consisted of seven two hour sessions. Two hours per session was considered the minimum time necessary to obtain meaningful interaction and participation. Breaks and changes of pace were included in each session to maintain interest and to avoid overloading the short-term memory. A short tea break was also included to facilitate social interaction as a contrast to the learning activities. A variety of educational strategies were used which emphasized learner participation. These included lectures, discussions, demonstrations, role-play, videos and visits. Reflective and group exercises were set to encourage participants to review and assimilate their new information.

TABLE 3.4

AIDS EDUCATIONAL PROGRAMME FOR MEDICAL TECHNOLOGISTS

SESSION	TITLE	TEACHING METHOD
1	Basic Virological Concepts	*Lecture, video, Reflective exercise
2a 2b	Introduction to retroviruses Laboratory demonstrations	Lecture, video, demonstration, small group exercise
3	Clinical aspects of AIDS and HIV infection	Hospital visit, class discussion, role-play
4	Transmission of HIV infection	Small group exercise class discussion, video, tutorial.
5	Laboratory Diagnosis of HIV infection and AIDS	Visit to SAIMR (Jhg) demonstration, group discussion
6	Research theories about the origins of HIV, and vaccine possibilities. Presentation of attendance certificates	Lecture and Questions

* Lectures were illustrated

The authenticity and validity of the educational programme was ensured as it was facilitated by experienced people active in the field of HIV diagnosis and research. Those involved included senior medical technologists experienced in diagnostic virology, medically qualified clinicians with experience in AIDS counselling and patient treatment, the professor of Virology who is an internationally recognized retroviral research scientist, and the researcher as the main presenter, who has experience and qualifications in both Virology and adult education.

A short resume of the six sessions is given. Further detailed information and the structuring of each session can be found in Annexure E.

During the first session, after the completion of Questionnaire No 1, the medical technologists were introduced to some of the basic concepts concerning the nature and characteristics of viruses, as without this background knowledge they would not be able to comprehend the complexities of HIV infection. Thereafter a video documentary described how AIDS was first recognized as a new disease, and introduced the two scientists, Luc Montagnier and Robert Gallo, who were responsible for the isolation and characterization of HIV, the etiological agent of AIDS. The session ended with a reflective exercise in which the participants briefly reviewed some of the aspects dealt with

during the session and stated what they had found the most interesting about viruses.

The second session was divided into two two-hour sessions to allow more time for discussion. The first part, 2a, started with an in-depth lecture on the general properties of retroviruses and on important aspects of the HIV virus. Links were made to the previous lecture on viruses, and the importance of laboratory safety precautions when handling specimens that may contain these viruses was stressed. This new information was reinforced during a class discussion. Later a video was shown in which a young nurse who had contracted AIDS through a contaminated blood transfusion was interviewed. Her progress during treatment on a drug trial was followed and the mode of action of the drug explained. The video then explored modern approaches to vaccine development and outlined their possible use in HIV vaccine production. Finally during small group discussions, the participants formulated research questions on an aspect of HIV that was of particular interest to them.

For the second part of Session 2, 2b, the participants were divided into small groups and rotated through various demonstrations in the virology laboratory. Each demonstration was facilitated by an experienced medical technologist and questions and discussions were encouraged. Viral morphology was demonstrated through the visualization of viruses in the electron microscope, and demonstrations on

laboratory safety techniques, and decontamination and sterilization procedures were given to stress the relevance of HIV, and other viral infections, in the daily activities of all medical technologists regardless of the department in which they work. Following these demonstrations the clinical stages of the disease were outlined as an introduction to the next session, and discussed with reference to the pathogenesis of retroviral infection.

During the third session the group visited the hospital where two clinicians involved in the counselling and treatment of patients with HIV, presented various case histories and scenarios for discussion. Later they involved the medical technologists in a thought-provoking role play which demonstrated aspects of patient counselling and highlighted the importance of the confidentiality of laboratory reporting.

In the fourth session the transmission of HIV infection was explored by the medical technologists through small group work. Each group then reported back to the class and their conclusions were discussed. The fifth session entailed a visit to a large serology laboratory in Johannesburg. Here the medical technologists were shown the various screening and confirmatory tests used in the diagnosis of HIV infection. Laboratory safety precautions when handling these specimens were also emphasized. In the sixth session research theories about the origins of the virus and vaccine

possibilities were discussed by a leading retrovirologist after which Questionnaire No 2 was completed by the participants. Certificates of attendance (Annexure G) were presented to all those who had completed the course.

3.57 Educational approaches

While there are many theories as to how learning occurs, learning may be commonly viewed as "a phenomenon evidenced by a change in behaviour," (Darkenwald and Merriam 1982), the change being facilitated by new knowledge and understanding. Bruner (1975) perceived the acquisition of knowledge to be an active process, a process in which students select and transform information, and construct their knowledge by relating the incoming information to a previously acquired psychological frame of reference. This previously acquired frame of reference is echoed in the Constructivist theory of knowledge which maintains that students come into learning situations with prior knowledge and preconceived ideas (Bodner 1986). During the process of constructing their new knowledge, using from the information given what for them is meaningful and relevant, misconceptions can arise which are extremely difficult to correct or eradicate. Therefore during this course the participants were placed in educational situations which attempted to challenge their preconceived perceptions.

Scientific and medical information with alternative viewpoints were presented together with experiences designed to contribute towards their cognitive and affective disequilibrium. Throughout the course the medical technologists were encouraged to reappraise their attitudes towards the disease and its etiological agent, and the important role that the medical technologists could play in the promotion of their own safety and the safety of those with whom they came into contact, was stressed.

In order to understand the challenge that this virus presents to science and medicine, some assimilation of basic virological concepts was necessary; it was thought that by highlighting certain key aspects in virology the students would be able to construct their knowledge from the currently accepted theories (Tawney 1974). Links were made continually between the new learning and the participant's prior knowledge and experience. Also the laboratory investigations carried out in each pathology laboratory on HIV or HIV-related infections was explored, and laboratory safety procedures were stressed to give maximum relevance to the practice of medical technology.

The course also explored the ways in which the HIV virus and knowledge about the virus was discovered and is progressing, in an attempt to demonstrate that scientific theories are not static. Students often feel that there is little scope for

debate when learning science, that knowledge once discovered should be accepted without question (Tawney 1974). The controversy which surrounds the origin of AIDS illustrates how many questions still remain unanswered in scientific discovery, and the emotional responses that these issues can evoke.

Medewar (1978) maintains that hypotheses arise by inspiration, through creative thinking. Once formulated they can be rigourously tested, after which they may be accepted, or discarded or modified if proved not feasible. During this course participant involvement and interaction was encouraged to facilitate meaningful learning and participants were encouraged to hypothesize during group exercises and discussions in an attempt to get them to debate and criticize ideas in a scientific rather than an emotional manner.

There is no single right or wrong method of teaching, therefore a variety of educational approaches was used. It was thought that the different approaches would stimulate interest and learning, and encourage the continued participation of the medical technologists. Changes of pace would assist in focussing attention, in minimizing boredom, and in mentally challenging the participants, thereby facilitating their learning, changing attitudes and resulting in deeper insights as new patterns of thought were produced.

Educational approaches used in the course included lectures, discussions, small group work, role play, demonstrations, videos, as well as visits to the hospital and another laboratory.

The study of HIV is one of the most rapidly advancing fields of medical science and new concepts and ideas are constantly replacing previously held beliefs. Therefore lectures were used to transmit large quantities of necessary information, as well as to supply a structure for the subject. Lectures utilize an expositive, teacher-centred strategy which relies on reception learning. As such they would seem to belong to the behaviouristic school of thought in which the learner is viewed as a passive recipient, an empty vessel waiting to be filled (Knowles 1978). However Ausubel (in Rowiszowski 1981) contends that meaningful reception learning can be achieved, therefore lectures are extremely useful at higher levels of education as there is seldom sufficient time for everyone to "discover" everything they need to know. If lectures are used to develop a framework of the subject, or as Ausubel termed them, "advance organizers", students can then integrate other relevant information into these structures as they acquire it. For the newly acquired information to be correctly integrated and assimilated as part of the student's knowledge base, it must be understood and perceived to be of relevance to the student personally. In order to achieve a high degree of understanding, the student's concentration and

interest must be maintained. Therefore during this course lectures were short, lasting approximately 15 - 20 minutes. Lectures were followed by either class or group discussions as it has been argued that this type of activity improves performance by allowing the short term memory sensory buffers to unload (Brooks 1984) and assists in the assimilation of the new information.

So during the course lectures served to provide a structure, as well as to explain the scientific concepts encountered in the literature. Studies have shown that students can either mentally process what is being said, or they can write notes; they can not do both simultaneously (Brooks 1984). As the processing of the given information was important, and the course could not "cover" all the information available, a manual was compiled which contained selected medical readings relevant to the topics dealt with in the various sections (references included in Annexure E). A learning guide on retroviruses, kindly donated by a commercial firm, was also provided.

Video presentations were used as sources of information as well as a means of visualizing concepts or phenonema and of stimulating thought and discussion. The participants being members of the "video generation" are accustomed to receiving and processing video-presented information and adapt readily to this approach (Mattson 1991).

Discussions were included in all sessions as they encourage cooperation among participants regardless of differences in race, sex or ability (Johnson and Johnson 1984), and students usually respond positively to situations where their ideas are sought and valued. Also during discussions misconceptions, which are extremely resistant to instruction, can be identified. They are only corrected when the student constructs a new concept that more appropriately explains his/her experiences (Bodner 1986), and often it is during discussions when ideas are bounced around and viewed from differents perspectives, that new concept construction occurs as the students gain deeper insights and fresh perspectives. Reflective exercises were incorporated into several of the sessions. They encourage the participants to think, discuss and reflect upon the learning that had occurred. Interaction between students can result in gestalt-like perceptual changes as new insights to problems or theories are gained. Rock and Palmer (1990) state that the educational implications of insightful learning can not be overestimated. They maintain that not only is it satisfying to grasp the solution to a problem, but it is far less likely to be forgotten than learning gained through rote memorization. The new insight also can be readily transferred to related problems, an important aspect for medical technologists working in areas where changes occur at ever-increasing rates. Demonstrations, role plays and visits to the laboratory and hospital, all encouraged active participation by the medical technologists and combined to make the education a personal experience for each learner.

4 RESULTS

4.1 Data Analysis

The pre- and postcourse questionnaires from the 38 medical technologists were matched using their personal and professional details. The overall pre- and postcourse knowledge and perception scores were summarized and tabulated in Tables 4.2a and 4.2b. Percentage change scores were calculated and the significant differences identified using the student t test. Correlational analysis was performed using the Pearson correlation coefficient. The percentage of correct knowledge responses in the various areas were tabulated in Tables 4.3 to 4.7, and those of the perceptions in Tables 4.8 to 4.11.

4.2 Overall results

Significant increases ($p < 0,05$) in the overall knowledge (Table 4.2a) of all participants were observed in four of the five categories, viz scientific knowledge, transmission, HIV diagnosis, and laboratory safety. There was a large change in scientific knowledge, 19,27% overall, which was consistent for both Group 1 and 2. Both groups had a good knowledge about HIV transmission before the course (72,3% for all participants) and changes therefore were small, although significant increases were demonstrated overall and for Group 1. Knowledge about the clinical and epidemiological aspects of AIDS and HIV infection was good prior to the course (68,4% for all participants), and only Group 2 showed any

TABLE 4.2a
OVERALL KNOWLEDGE OF MEDICAL TECHNOLOGISTS
Percentage of correct responses

CATEGORY	All participants [n= 38] PreQ	PostQ	Change	Group 1 [n = 18] PreQ	PostQ	Change	Group 2 [n = 20] PreQ	PostQ	Change
Scientific knowledge:									
Total means	47,4	66,72	+19,27	49,26	69,71	+20,45	45,83	64,03	+18,19
Standard deviation/error*	9,1	11,59	2.11	10,02	9,94	3,23	9,33	12,55	2,82
t score			9,12			6,33			6,45
p value			0,0001			0,0001			0,0001
Transmission									
Total means	72,3	77,01	+4,71	71,78	80,26	+8,48	72,76	74,08	+1,31
Standard deviation/error*	7,2	11,62	1,90	8,41	11,32	2,60	6,11	11,37	2,58
t score			2,48			3,26			0,51
p value			0,0180			0,0046			0,6158
Clinical and Epidemiology									
Total means	68,42	74,06	+5,64	70,63	71,43	+0,79	66,43	76,43	+10,00
Standard deviation/error*	16,66	14,80	3,30	15,08	17,67	5,22	18,11	11,61	4,03
t score			1,71			0,15			2,48
p value			0,0960			0,8811			0,0225
HIV Diagnosis									
Total means	32,46	58,38	+25,93	34,26	57,99	+23,73	30,83	58,75	+27,92
Standard deviation/error*	24,79	16,84	3,71	31,56	17,91	6,64	17,33	16,27	3,87
t score			6,99			3,57			7,21
p value			0,0001			0,0023			0,0001
Laboratory Safety									
Total means	46,84	61,93	+15,09	45,55	62,04	+16,48	48,00	61,83	+13,83
Standard deviations/error*	17,33	15,66	3,14	18,86	14,38	4,83	16,24	17,12	4,20
t score			4,80			3,41			3,29
p value			0,0001			0,0033			0,0038

* standard deviations were calculated for the pre- and postquestionnaire responses and standard errors calculated for the change scores.

significant increase. The most noticable change occurred in the category which dealt with HIV diagnosis, this was expected as knowledge before the course in this area was very low (32% overall). Knowledge about laboratory safety also showed a significant increase with about two-thirds (61,9%) of the respondents answering correctly.

Apart from the differences between the groups seen in the categories of transmission and clinical and epidemiological aspects, the levels and increase in knowledge in Groups 1 and 2 were similar, therefore the overall results of both groups will be discussed unless otherwise stated.

There were fewer significant changes in the overall perceptions (Table 4.2b) of the medical technologists and these occurred mainly in Group 1 which showed a heightened awareness of AIDS, changes in their attitudes towards persons with AIDS, and changes in their perceptions of laboratory safety. For Group 2 the only significant change occurred in their perception of laboratory safety.

Table 4.2c shows that there was a correlation between the perceptions of the importance, and awareness of AIDS (r = 0,42) at a 0,01 significance level; correlations were also evident at a 0,05 significance level between their knowledge of transmission and the clinical and epidemiological aspects (r = 0,34), as well as between their scientific knowledge and knowledge of HIV diagnosis (r = 0,32).

TABLE 4.2b
OVERALL PERCEPTIONS OF MEDICAL TECHNOLOGISTS
Percentage of correct responses

CATEGORY	All participants [n = 38] PreQ	PostQ	Change	Group 1 [n = 18] PreQ	PostQ	Change	Group 2 [n = 20] PreQ	PostQ	Change
Awareness of AIDS									
Total means	62,38	70,44	+8,07	57,41	73,50	+16,10	66,85	67,69	+0,84
Standard deviation/error*	13,16	12,07	2,80	13,28	9,59	3,81	11,62	13,58	3,40
t score			2,87			4,22			0,25
p value			0,0066			0,0006			0,8076
Importance of AIDS									
Total means	62,88	60,63	-2,25	65,20	63,11	-2,09	60,79	58,40	-2,40
Standard deviation/error*	10,09	12,73	2,75	9,23	12,69	4,19	10,59	12,67	3,72
t score			-0,82			-0,50			-0,64
p value			0,4187			0,6241			0,5281
Attitude towards persons with AIDS									
Total means	79,57	86,53	+6,96	76,14	88,23	+12,09	82,65	85,00	+2,35
Standard deviation/error*	14,96	13,18	2,40	16,20	12,60	3,80	13,42	13,82	2,71
t score			2,90			3,19			0,87
p value			0,0062			0,0053			0,3965
Perceptions of laboratory safety									
Total means	51,84	71,66	+19,82	51,67	75,21	+23,55	52,00	68,46	+16,46
Standard deviation/error*	21,54	16,20	4,72	23,58	15,95	7,89	20,16	16,75	5,58
t score			4,19			2,98			2,95
p value			0,0002			0,0083			0,0083

*Standard deviations were calculated for the pre- and postquestionnaire responses and standard errors calculated for the change scores.

There was no significant correlation (r = 0,13) between the participant's knowledge and perceptions of laboratory safety practices (not tabulated).

Table 4.2d shows that no significant differences in the increase of knowledge or change in perceptions were found between students and other ranks of qualified medical technologists. Males, and medical technologists with children were significantly more aware of AIDS; and the latter group also showed significant differences in their perceptions of its importance.

4.3 Scientific knowledge about the HIV virus (Table 4.3)

Before the course 73,7% of the participants knew the meaning of the abbreviation, "AIDS", but only 52,6% of them were able to state the meaning of "HIV," although 84,2% knew that it was the causative agent of AIDS. Knowledge of these abbreviations improved after the course. A less familiar abbreviation "ARC", which was discussed during the clinical session, was remembered by 44,7% of all the participants after the course.

That similar viruses may be found in monkeys was fairly well known before the course (68,4%), but few realised that these viruses may also infect cats (15,8%), horses (0%), and birds (0%), and even after the course this understanding was only seen in about a third of the participants.

TABLE 4.2c

CORRELATION BETWEEN INCREASES IN KNOWLEDGE AND CHANGES IN PERCEPTION

Categories
1: Perception: importance of AIDS
2: Perception: awareness of AIDS
3: Knowledge: scientific knowledge
4: Knowledge: clinical and epidemiological
5: Knowledge: transmission
6: Knowledge: diagnosis

	1	2	3	4	5	6
1						
2	0,42**					
3	0,27	0,27				
4	0,05	-0,08	0,10			
5	0,13	0,18	0,30	0,34*		
6	-0,01	0,13	0,32*	-0,01	0,30	

* significant at 0,05
** significant at 0,01

TABLE 4.2d

DIFFERENCES IN KNOWLEDGE AND PERCEPTION
("t" scores) between:-

i. students (n = 17) and qualified (n = 21) medical technologists,
ii. males (n = 23) and females (n = 15), and
iii. those who have children (n = 19) and those who do not (n = 19).

CATEGORY	RANK **	SEX **	HAVE/DON'T ** HAVE CHILDREN
KNOWLEDGE			
Scientific	-0,41	-0,62	-1.67
Transmission	-0,17	-0,01	-0,87
Clinical & Epid	0,29	1,15	0,34
HIV diagnosis	-0,97	-0,88	-0.42
Lab Safety	-0,50	-0,23	0,00
PERCEPTION			
Awareness	0,55	-1,94*	-3,17*
Importance	1,49	-1,25	-2,29*
Attitude towards HIV + persons	-0,80	-1,65	-0,57
Lab Safety	-1,11	-0,57	1,39

** t scores at 36 degrees of freedom
* significance at 0,05

Has the HIV virus been detected in:-							
blood?	yes	100,0	100,0	100,0	100,0	100,0	100,0
saliva?	yes	34,2	89,5	44,4	88,9	25,0	90,0
urine?	yes	13,2	55,3	5,6	55,6	20,0	55,0
semen?	yes	92,1	100,0	100,0	100,0	85,0	100,0
breast milk?	yes	39,5	97,4	38,9	94,4	40,0	100,0
stool?	no	47,4	34,2	66,7	61,1	30,0	10,0
Can HIV antibodies be detected:-							
immediately after infection?	no	65,8	78,9	50,0	72,2	80,0	85,0
2 - 3 weeks after infection?	yes	44,7	86,8	50,0	83,3	40,0	90,0
What is meant by "the window period?"							
(open-ended question)							
(the time from infection to the appearance of antibodies)	correct	13,2	60,5	11,1	61,1	15,0	60,0
	partially correct	2,6	13,2		11,1	5,0	15,0
Does the presence of HIV antibodies in a seemingly-healthy person indicate							
they have immunity against AIDS?	no	60,5	89,5	55,6	83,3	65,0	95,0
they are capable of transmitting HIV?	yes	92,1	97,4	100,0	94,4	85,0	100,0
they have the disease of AIDS?	no	44,7	57,9	50,0	66,7	40,0	50,0
Where did the HIV virus came from?							
[open-ended question]							
one theory, or part thereof		34,3	50,0	44,5	50,0	25,0	50,0
two theories		2,6	10,5		16,7	5,0	5,0
three theories		2,6	5,3	5,6	11,1		
MEAN		47,46	66,72	49,26	69,71	45,83	64,03
STANDARD DEVIATION		9,68	11,60	10,02	9,93	9,33	12,55

TABLE 4.3.
SCIENTIFIC KNOWLEDGE ABOUT AIDS AND HIV
Percentage of correct responses

QUESTION	Ans	All participants [n = 38] PreQ	All participants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
Give the full names for the following abbreviations: AIDS, HIV, ARC (open-ended question)							
AIDS: Acquired Immunodeficiency Syndrome.....		73,7	86,8	50,0	83,3	95,0	90,0
HIV: Human Immunodeficiency Virus.....		52,6	71,1	61,1	88,9	45,0	55,0
ARC: AIDS-related complex.....		N/A	44,7	N/A	61,1	N/A	30,0
Does HIV cause AIDS?.....	yes	84,2	92,1	77,8	88,9	90,0	95,0
Are similar diseases/viruses found in other animals, such as:-							
monkeys?.....	yes	68,4	97,4	72,2	100,0	65,0	95,0
cats?.....	yes	15,8	34,2	16,7	27,8	15,0	40,0
horses?.....	yes	0,0	34,2	0,0	38,9	0,0	30,0
birds?.....	yes	0,0	21,1	0,0	11,1	0,0	30,0
frogs?.....	not sure	47,4	26,3	50,0	22,2	45,0	30,0
insects?.....	not sure	50,0	28,9	61,1	22,2	40,0	35,0
Which cells can the virus infect and replicate in?							
lymphocytes?.....	yes	81,6	100,0	88,9	100,0	75,0	100,0
erythrocytes?.....	no	36,8	73,3	44,4	83,3	30,0	65,0
macrophages?.....	yes	39,4	84,2	50,0	94,4	30,0	75,0
glial cells?.....	yes	5,3	57,9	0,0	83,3	10,0	35,0
osteocytes?.....	not sure	57,9	34,2	61,1	33,3	55,0	35,0

Their understanding that HIV infects and replicates in lymphocytes was good before the course (81,6%), and 100% of the participants correctly stated that the virus could be detected in blood. While most (92,1%) of the participants knew that the virus could be found in semen, it was not well known before the course that HIV could infect other cells such as macrophages (39,4%), and glial cells (5,3%), and be found in diverse body fluids such as saliva (34,2%), urine (13,2%), and breast milk (39,5%). After the course this knowledge had risen considerably (Fig 4.3).

HIV antibodies are usually detected only some weeks after infection, and while 65,8% of all the participants correctly stated that antibodies could not be detected immediately after infection, only 44,7% identified the normal length of the incubation period before the course. After the course this figure rose to 86,8% of all the participants. The period before the appearance of antibodies is termed the "window period", a term which few (13,2%) were able to correctly specify before the course in an open-ended question. After the course 60,5% of all the participants were able to state the meaning of this phrase.

The presence of antibodies in an individual usually indicates immunity against that particular virus, that this is not true of HIV was recognized by 60% of the participants before the course; in fact most (92,1%) correctly stated that persons with HIV antibodies are capable of transmitting the virus.

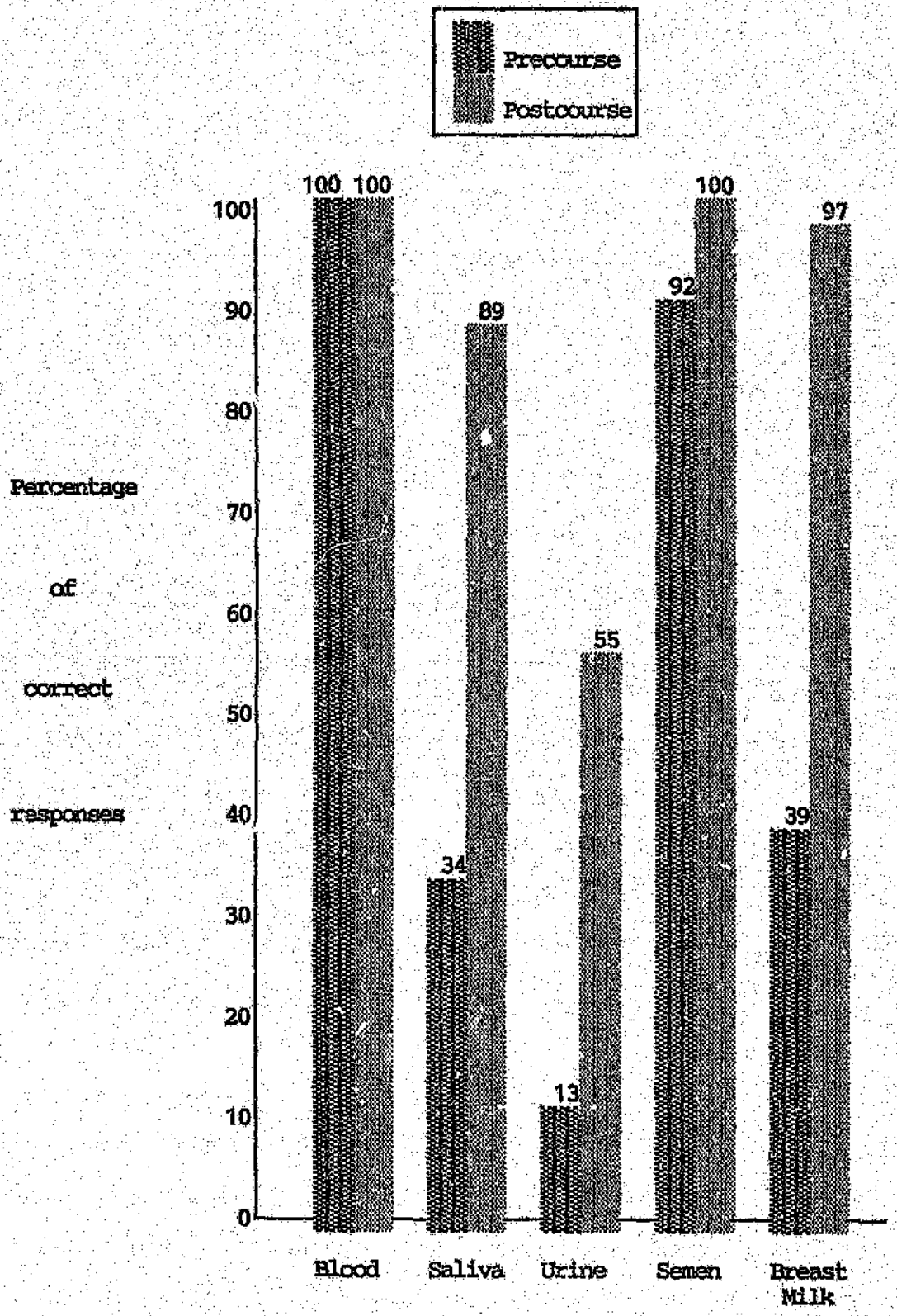


Fig 4.3

DETECTION OF HIV IN BODY FLUIDS

However less than half (44,7%) understood that infection, as evidenced by the presence of HIV antibodies, does not necessarily indicate current disease. In most of these areas there was a considerable increase in knowledge after the course.

The debate surrounding the origins of the HIV virus which had created some interest, was addressed during the final session, and by then 50% of the participants were able to list at least one of the theories discussed.

4.4 Knowledge about the transmission of AIDS/HIV (Table 4.4)

Knowledge about transmission was good before the course; all the medical technologists knew that HIV was a sexually transmitted disease, and most (94,7%) realized that the virus can be transmitted by healthy-looking carriers. Seventy-one percent of the participants realized there was a risk of infection when handling specimens at work, however most (76,3%) believed there was little risk of contracting HIV during normal social interaction at home.

In certain areas a negative change occurred as the medical technologists learnt that the virus can be found in most body fluids. This led to some perceiving a risk in holding hands or kissing an infected person who may have cuts or sores, in using toilet seats, and in donating or receiving blood.

TABLE 4.4.
KNOWLEDGE ABOUT THE TRANSMISSION OF HIV INFECTION
Percentage of correct responses

QUESTION	Ans	All partcipants [n = 38] PreQ	All partcipants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
Can HIV infection be transmitted by a healthy carrier of the virus?...	yes	94,7	100,0	94,4	100,0	95,0	100,0
Is HIV sexually-transmitted?.....	yes	100,0	100,0	100,0	100,0	100,0	100,0
Are you at risk of HIV infection							
at work when handling specimens?.....	yes	71,1	81,6	77,8	83,3	65,0	80,0
	no	10,5	13,2	5,6	11,1	15,0	15,0
	not sure	18,4	5,3	16,7	5,6	20,0	5,0
at home during normal social contact?..no		76,3	84,2	66,7	94,4	85,0	75,0
What is the risk of transmitting HIV							
by holding hands?.....	none	92,1	73,7	88,9	77,8	95,0	70,0
by kissing on the cheek?.....	none	97,4	78,9	100,0	83,3	95,0	75,0
by open-mouth kissing.....	slight	63,2	71,1	72,2	61,1	55,0	80,0
by sharing cups and utensils?.....	none	86,8	78,9	94,4	83,3	80,0	75,0
by having sex with many people?.....	high	97,4	100,0	100,0	100,0	95,0	100,0
by mosquito bites?.....	none	52,6	65,8	50,0	61,1	55,0	70,0
	slight	39,5	31,6	44,4	38,9	35,0	25,0
by donating blood?.....	none	44,7	39,5	44,4	38,9	45,0	60,0
by receiving blood?.....	slight	36,8	18,4	27,8	27,8	45,0	10,0
	high	63,2	78,9	72,2	72,2	55,0	85,0
by toilet seats?.....	none	84,2	36,8	83,3	11,1	85,0	60,0
	slight	13,2	52,6	11,1	77,8	15,0	30,0
by needleprick accidents?.....	slight	23,7	44,7	27,8	66,7	20,0	25,0
	high	76,9	55,3	72,2	33,3	80,0	75,0
What is the risk of transmission via a needlestick accident?.....	0,4%.	5,3	63,2	0,0	83,3	10,0	45,0
Can a mother give HIV to her unborn child?.....	yes	97,4	89,5	100,0	100,0	95,0	80,0
Name the main routes of transmission of HIVirus? [open-ended question]	sexual	94,7	100,0	88,9	100,0	100,0	100,0
	parenteral	42,1	71,1	22,2	61,1	60,0	80,0
	vertical	5,3	42,1	11,1	61,1	0,0	25,0
TOTAL MEANS.....		72,30	77,01	71,78	80,26	72,76	74,08
STANDARD DEVIATION.....		7,21	11,62	8,41	11,32	,11	11,37

Needlestick accidents, which according to the literature have a 0,4% risk factor, were considered high risk occurrences by the majority (76,9%) before the course; afterwards some (44,7%) realized that the risk was not quite as high as had originally been believed.

Although it was correctly stated by 97,4% before and 89,5% after the course in a closed choice question, that HIV could be vertically transmitted from a mother to her unborn child, when asked to name the main routes of transmission in an open-ended question, only 5,3% mentioned this important route of infection before the course and even afterwards only 42.1% of the medical technologists noted it in their answer.

4.5 Knowledge about clinical and epidemiological aspects of HIV (Table 4.5)

All the participants knew, before the course, that AIDS is a fatal disease, most realized that there is no cure (92,1%) or vaccine (81,6%), and that an HIV-infected person may look and feel healthy (94,7%). Their knowledge in these areas was good and very little change was possible, and hence could not occur.

That AIDS in South Africa is predominantly a heterosexual disease was known by 57,9% of the participants before the course, this increased to 78,9% afterwards. However their knowledge of the worldwide infection rates during 1992 and those predicted for the year 2000 was poor both before and after the course.

TABLE 4.5
CLINICAL AND EPIDEMIOLOGICAL KNOWLEDGE OF AIDS/HIV INFECTION
Percentage of correct responses

QUESTION	Ans	All participants [n= 38] PreQ	All participants [n= 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
How many HIV-infected people will develop AIDS and die.....	all/ most	100,0	100,0	100,0	100,0	100,0	100,0
Can AIDS be cured?.....	no	92,1	94,7	94,4	94,4	90,0	95,0
Is there a vaccine available against AIDS/HIV infection?.....	no	81,6	84,2	88,9	72,2	75,0	95,0
Can someone who looks and feels healthy carry the HIV virus?.....	yes	94,7	97,4	94,4	94,4	95,0	100,0
In South Africa is AIDS predominately a disease of homo- or heterosexuals?.	hetero	57,9	78,9	61,1	77,8	55,0	80,0
Approximately how many millions of people worldwide are infected with AIDS/HIV,							
now [July 1992]?.....	 10	23,7	15,8	27,8	22,2	20,0	10,0
estimated by the year 2000?.	 40	28,9	47,4	27,8	38,9	30,0	55,0
TOTAL MEANS.....		68,42	74,06	70,63	71,43	66,43	76,43
STANDARD DEVIATION.....		16,66	14,80	15,08	17,67	18,11	11,61

4.6 Knowledge about the laboratory diagnosis of HIV infection (Table 4.6

While 76,3% of the medical technologists knew that HIV infection is usually diagnosed by the detection of HIV-specific antibodies, prior to the course few could name any of the screening assays used or detail the ancillary tests done in their laboratories which assist in establishing a diagnosis of AIDS. Afterwards 73,7% of participants could name one or two of the screening and confirmatory assays used. Before the course less than a third (28,9%) of the medical technologists realized that screening assays should be more sensitive while confirmatory ones need to be more specific, this figure rose to 65,8% after the course.

4.7 Knowledge of laboratory safety procedures (Table 4.7)

Before the course only 39,5% of the medical technologists thought that the safety precautions taken in their laboratories were sufficient; and this figure did not rise dramatically after the course (42 1%).

While the majority of the participants stated both before and after the course that care should be taken with any specimen, and not only with those marked as biohazardous, in the precourse questionnaire less than half (44,7%) realized that these precautions should also extend to formalin-fixed specimens. This realization increased during the course, and in the post-questionnaire 84,2% stated that safety precautions should be taken with these specimens as well.

TABLE 4.6.
KNOWLEDGE ABOUT THE LABORATORY DIAGNOSIS OF HIV INFECTION
Percentage of correct responses

QUESTION	Ans	All participants [n = 38] PreQ	All participants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
Is HIV infection usually diagnosed by the detection of antibody or antigen?.....	antibody	76,3	92,1	72,2	94,4	80,0	90,0
What screening assays are used in the diagnosis of HIV? [open-ended question]	2 test	10,5	13,2	16,7	22,2	5,0	5,0
	1 test	13,2	73,7	11,1	66,7	15,0	80,0
What tests could be done in your laboratory which would assist in establishing a diagnosis of AIDS? [open-ended question]	2 test	21,1	42,1	27,8	33,3	15,0	50,0
	1 test	10,5	31,6	11,1	22,2	10,0	40,0
What confirmatory tests are used in the diagnosis of HIV? [open-ended question]	2 test	N/A	7,9	N/A	5,6	N/A	10,0
	1 test	N/A	76,3	N/A	77,8	N/A	75,0
Should screening assays should be more sensitive or specific?.....	sensitive	28,9	65,8	22,2	77,8	35,0	55,0
TOTAL MEANS.....		32,46	58,39	34,26	57,99	30,83	58,75
STANDARD DEVIATION.....		24,79	16,84	31.56	17,91	17,33	16,27

TABLE 4.7.

KNOWLEDGE ABOUT LABORATORY SAFETY PROCEDURES

Percentage of correct responses

QUESTION		All participants [n = 38] PreQ	All participants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
Do you think that the safety precautions taken in your laboratory will protect you against infection with HIVirus?.....	yes	39,5	42,1	44,4	55,6	35,0	30,0
	no	7,9	13,2	0,0	0,0	15,0	25,0
	not sure	52,6	44,7	55,6	44,4	50,0	45,0
In the laboratory should safety precautions be taken with:-							
formalin-fixed specimens?.....	yes	44,7	84,2	27,8	83,3	60,0	85,0
biohazard-labelled specimens?.....	yes	81,6	92,1	77,8	94,4	85,0	90,0
any specimen?.....	yes	97,4	97,4	100,0	100,0	95,0	95,0
Do you wear gloves when handling specimens?.....	yes	39,5	65,8	44,4	77,8	35,0	55,0
.....	sometimes	57,9	34,2	55,6	22,2	60,0	45,0
How do you dispose of the following in your laboratory:- [open-ended]							
blood?.....	Autoclave)	60,5	78,9	61,1	83,4	60,0	75,0
CSF?.....	and/or)	52,6	76,3	50,0	83,4	55,0	70,0
tissues and/or stools?.....	Incinerate)	47,4	71,0	50,0	72,3	45,0	70,0
buffers and/or solutions?.....	Disinfect)	39,5	36,8	33,3	33,3	45,0	40,0
waste liquids?.....	&/or above)	34,2	36,8	33,3	33,3	35,0	40,0
What would you do if you accidentally pricked yourself with a needle containing blood from a patient? [open-ended, maximum = 10].....	>5	2,6	34,1	5,6	27,8	0,0	40,0
.....	<5	97,4	65,8	94,5	72,2	100,0	60,0
[within the hour one should:- make the wound bleed, wash and disinfect it; report accident to a senior; test own serum for HIV, and test patient's serum for HIV. Request AZT if necessary]							
TOTAL MEANS.....		46,84	61,93	45,55	62,04	48,0	61,83
STANDARD DEVIATION.....		17,33	15,66	18,86	14,38	16,24	17,12

When questioning the actual safety practices of the medical technologists, only 39,5% wore gloves when handling specimens; and although this figure rose to 65,8% after the course, it still did not represent a satisfactory percentage. Their knowledge of the correct disposal techniques of specimens and assay wastes was poor. Many medical technologists when answering the open-ended question dealing with this aspect, gave simplistic answers such as "down the sink", "in discarding solutions" or "wastebucket" which showed little insight into the safe disposal of potentially infectious materials. After the course even though knowledge had improved, only 36,8% realised that buffers or waste liquids from assays need to be disinfected before disposal.
Few of the participants before (2,6%) or after (34,1%) the course were able to adequately describe the procedures that should be followed after a needlestick accident.

4.8 Perceptions: Awareness of AIDS/HIV infection (Table 4.8)

Before the course most of the medical technologists felt they knew a little (31,6%), or something (47,4%) about AIDS/HIV infection, while after the course 63,2% of them felt they now knew a lot. When asked how AIDS awareness amongst medical technologists could be increased, most stressed education which included activities such as courses, symposia, lectures, posters and pamphlets. Other suggestions included visiting patients with AIDS, and the stressing of laboratory safety procedures

Virtually all the participants discussed AIDS with their friends, but there were some who indicated that they did not discuss this subject with their families. Most stated that their information about AIDS/HIV had been obtained from medical literature (65,8%) and information leaflets (50%). Magazines (44,7%), TV (42,1%) and newspapers (36,8%) were also sources of information, but little appears to have been gleaned from radio (21,1%) or telephone hot lines (5,3%) (Fig 4.8).

4.9 Perceptions of the importance of AIDS (Table 4.9)

AIDS/HIV infection was perceived to be very important by the participants; and reasons given for the importance of the disease to them included being able to educate others, to protect oneself, and to know how to deal with persons

TABLE 4.8.

PERCEPTIONS: AWARENESS OF AIDS

Percentage of correct responses

QUESTION	Ans	All partcipants [n = 38] PreQ	All partcipants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
How much do you think you know about AIDS/HIV?.....a lot		13,2	63,2	5,6	66.7	20,0	60,0
.....some		47,4	31,6	50,0	33,3	45,0	30,0
.....little		31,6	5,3	33,3	0,0	30,0	10,0
.....nothing		7,9	0,0	11,1	0,0	5,0	0,0
Do you talk about AIDS with your friends?.....	yes	97,4	92,1	94,4	94,4	100,0	90,0
Do you talk about AIDS with your family?.....	yes	84,2	92,1	83,3	94,4	85,0	90,0
How do you think AIDS awareness could be increased among medical technologists? [open-ended question]							
*education.....		92,2	89,5	94,5	100,0	90,0	80,0
visit patients with AIDS.....		7,9	7,9	5,6	0,0	55,0	15,0
stress laboratory safety.....		7,9	7,9	11,1	11,1	5,0	0,0
*educational activities suggested included:- courses, symposia, lectures, posters, pamphlets.							

Where did you learn about AIDS/HIV infection? [Questionnaire 1 only]	Lot	Some	Nothing	Lot	Some	Nothing	Lot	Some	Nothing
radio.....	21,1	68,4	10,5	0,0	88,9	11,1	40,0	50,0	10,0
TV.....	42,1	57,9	0,0	33,3	66,7	0,0	50,0	50,0	0,0
newspapers?.....	36,8	57,9	5,3	22,2	66,7	11,1	50,0	50,0	0,0
magazines?.....	44,7	47,4	7,9	27,8	55,6	16,7	60,0	40,0	0,0
information leaflets?.....	50,0	42,1	7,9	38,9	50,0	11,1	60,0	35,0	5,0
telephone hotlines?.....	5,3	18,4	76,3	0,0	16,7	83,3	10,0	20,0	70,0
medical literature?.....	65,8	28,9	5,3	55,6	33,3	11,1	75,0	25,0	0,0
MEAN.....	62,38	70,44		57,41	73,50		66,85	67,69	
STANDARD DEVIATION.....	13,16	12,07		13,28	9,59		11,62	13,58	

Sources yielding "a lot" of information about AIDS in percentage

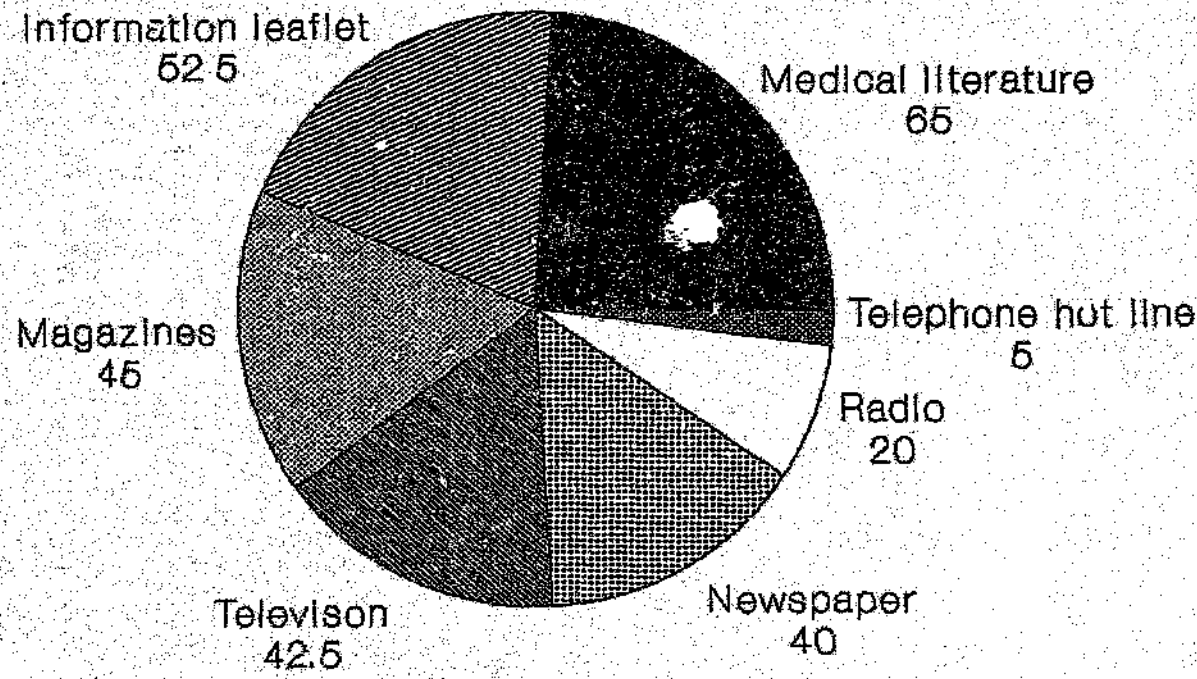


Fig.: 4.8.

TABLE 4.9.
PERCEPTIONS OF THE IMPORTANCE OF AIDS
Percentage of correct responses

QUESTION	Ans	All participants [n = 38] PreQ	All participants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
Do you think that all the fuss made about AIDS/HIV infection is necessary?	yes	86,8	92,1	88,9	94,4	85,0	90,0
How serious a disease do you consider AIDS/HIV infection to be?	very	97,4	94,7	100,0	100,0	95,0	90,0
Is there anything that you want to know about AIDS/HIV infection? [open-ended question in Questionnaire 1]							
.all about the virus		55,2	N/A	55,6	N/A	55,0	N/A
.about a cure or vaccine		15,8	N/A	22,2	N/A	10,0	N/A
.about laboratory diagnosis &/or patient counselling		2,6	N/A	5,6	N/A	0,0	N/A
Was there anything that you wanted to know that was not dealt with? [open-ended question in Questionnaire 2]							
.everything was covered		N/A	92,1	N/A	88,9	N/A	95,0
.costs of laboratory tests and patient care		N/A	2,6	N/A	5,6	N/A	10,0
Why do you think it is important for you to know about AIDS/HIV infection? [open-ended question]							
.to educate others		68,4	50,0	77,8	77,8	60,0	25,0
.to protect oneself		60,5	57,9	55,5	38,9	65,0	75,0
.to be able to deal with people with AIDS		2,6	2,6	5,6	0,0	0,0	5,0
Do you think that courses about AIDS/HIV infection specifically for medical technologists, are necessary?	yes	92,1	97,3	88,9	94,5	95,0	100,0
Has your new knowledge of AIDS/HIV infection affected your way of life? [open-ended question in Questionnaire 2]	yes	N/A	63,2	N/A	61,1	N/A	65,0
If yes, how? [open-ended question in Questionnaire 2]							
. take more care, especially in the laboratory		N/A	39,5	N/A	50,0	N/A	30,0
. more responsible about sex		N/A	26,4	N/A	11,2	N/A	40,0
. feel threatened		N/A	2,6	N/A	5,6	N/A	0,0
MEAN		62,88	60,63	65,20	63,11	60,79	58,40
STANDARD DEVIATION		10,09	12,73	9,23	12,69	10,59	12,67

infected with AIDS. Before the course more than half the participants (55,2%) merely stated that they wanted to know everything about AIDS and HIV, a few were more specific wanting to know about possible cures or vaccines, the laboratory diagnosis and how patients are counselled.
Virtually all the participants (92,1%) stated that courses specifically designed for them as medical technologists were necessary, and 63,2% stated that their new knowledge of AIDS had affected their way of life; they were now taking more precautions in the laboratory, and being more responsible about sexual matters. A small proportion (2,6%) felt threatened.

4.10 Attitude towards persons with AIDS/HIV infection (Table 4.10)

Before the course 47,5% of the participants felt they would like to be informed about an HIV-infected colleague, but after the course when the right to privacy of persons infected with HIV was realized, 72,5% of the participants indicated that other laboratory workers should not be informed of an infected colleague (Fig 4.10). Most of the participants (68,4% before and 73,7% after the course) agreed that the HIV-infected person should continue their normal duties in the laboratory, while a small minority (23,7% before and 26,3% afterwards) advocated a change of duties to more clerically-orientated work. No discrimination, cooling of friendships, or avoidance of HIV-infected persons was

TABLE 4.10.
ATTITUDE TOWARDS PERSONS WITH AIDS/HIV INFECTION
Percentage correct responses

QUESTION	Ans	All partcipants [n = 38] PreQ	All partcipants [n = 38] PostQ	Group 1 [n = 18] PreQ	Group 1 [n = 18] PostQ	Group 2 [n = 20] PreQ	Group 2 [n = 20] PostQ
If a medical technologist tested HIV positive, do you think that his/her work colleagues should be informed of this?	no	47,4	71,1	50,0	66,7	40,0	75,0
	yes	34,2	18,4	27,8	16,7	45,0	20,0
	not sure	18,4	10,5	22,2	16,7	15,0	5,0
If a medical technologist tested HIV positive, should s/he continue working in the laboratory?	yes	73,7	89,5	77,8	94,4	70,0	85,0
	no	5,3	2,6	0,0	0,0	10,0	5,0
	not sure	21,1	7,9	22,2	5,6	20,0	10,0
If the infected medical technologist did continue working in the laboratory, what sort of work should s/he do? [open-ended question]							
continue with normal duties		58,4	73,7	72,2	77,8	55,0	70,0
change to clerical duties		23,7	26,3	11,1	22,2	35,0	30,0
If a close friend of yours tells you s/he is infected with HIV, how would you react? Would you:-							
remain as friendly as before?	yes	81,6	86,8	72,2	83,3	90,0	90,0
remain friendly but avoid any physical contact?	no	50,0	57,9	44,4	61,1	55,0	55,0
cool the friendship?	no	86,8	92,1	83,3	94,4	90,0	90,0
avoid him or her?	no	97,4	97,4	94,4	100,0	100,0	95,0
Would you be willing to be tested for HIV?	yes	76,3	78,9	72,2	83,3	80,0	75,0
MEAN		79,57	86,53	76,14	88,23	82,65	85,00
STANDARD DEVIATION		14,96	13,18	16,20	12,60	13,42	13,82

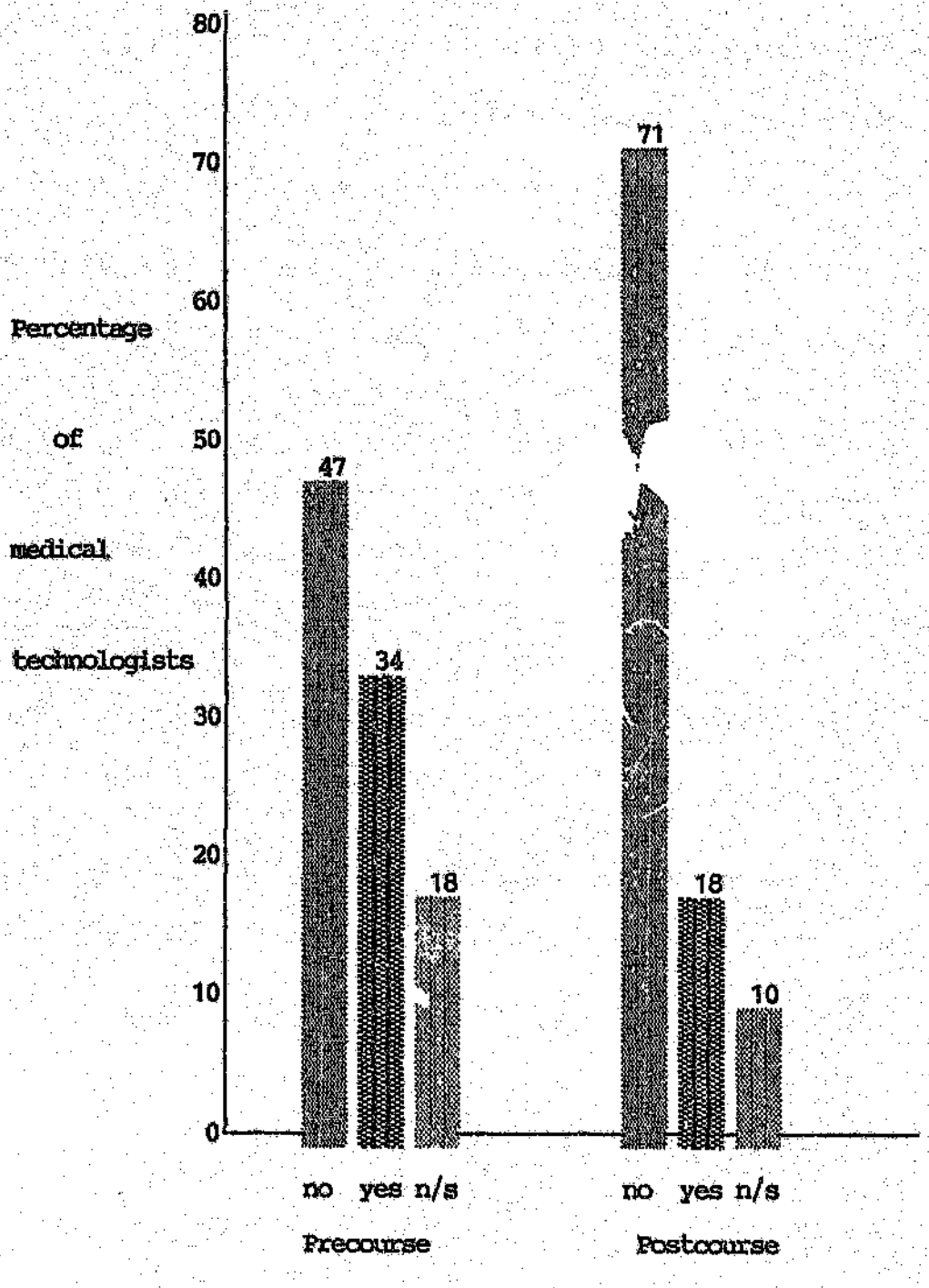


Fig 4.10

BEING INFORMED ABOUT AN HIV-INFECTED WORK COLLEAGUE

envisaged by the medical technologists, either before or after the course; also 76,3% of the participants indicated that they were willing to be tested for HIV antibodies.

4.11 Perceptions of laboratory safety

(Table 4.11)

Many (71,1%) of the medical technologists did perceive themselves to be at risk of contracting HIV infection when at work, however they did not think that HIV would necessarily spread among medical technologists due to the nature of their work. This perception of being at risk appears to have increased during the course with 50% of all the participants stating they did not think that the safety precautions were adequate in their laboratories (Fig 4.11). One or two suggestions for improvement were given by each candidate, and 86,8% stated they are now being more careful in the laboratory.

TABLE 4.11.
PERCEPTIONS OF LABORATORY SAFETY
Percentage of correct responses

QUESTION	Ans	All partcipants [n = 38] PreQ	PostQ	Group 1 [n = 18] PreQ	PostQ	Group 2 [n = 20] PreQ	PostQ
Do you think you are at risk of catching AIDS/HIV infection at work when handling specimens?	yes	71,1	81,6	77,8	83,3	65,0	80,0
	no	10,5	13,2	5,6	11,1	15,0	15,0
	not sure	18,4	5,3	16,7	5,6	20,0	5,0
Do you think that HIV infection will spread among medical technologists at GaRankuwa Hospital and Medunsa because they may work with HIV-infected specimens?	yes	42,1	26,3	33,3	33,3	50,0	20,0
	no	34,2	60,5	38,9	66,7	30,0	55,0
	not sure	23,7	13,2	27,8	0,0	20,0	25,0
Can you suggest how the safety precautions used in your laboratory can be improved? [open-ended question]							
two suggestions		5,3	28,9	5,6	38,9	5,0	20,0
one suggestion		65,8	52,6	66,7	44,4	65,0	60,0
Do you think that the safety precautions are adequate in your laboratory?	yes	26,3	39,5	27,8	44,4	25,0	35,0
	no	50,0	39,5	33,3	27,8	65,0	50,0
	not sure	23,7	21,1	38,9	27,8	10,0	15,0
How has your new understanding of HIV infection affected your attitude towards practicing laboratory safety precautions? [open-ended question in Q2]							
. more one more careful		N/A	86,8	N/A	88,9	N/A	85,0
. safety is adequate		N/A	2,6	N/A	0,0	N/A	5,0
MEAN		51,84	71,66	51,66	75,21	52,00	68,46
STANDARD DEVIATION		21,54	16,20	23,58	15,95	20,16	16,15

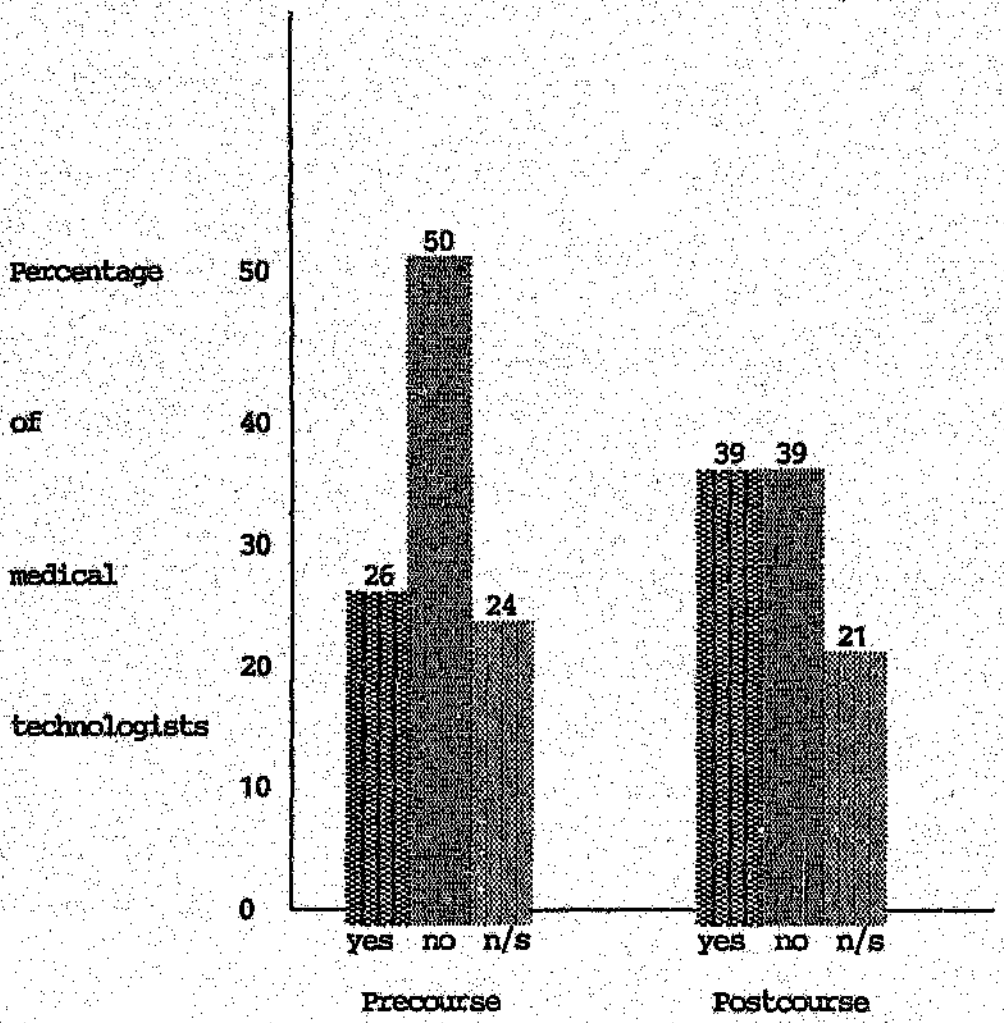


Fig 4.11

PERCEPTIONS THAT LABORATORY SAFETY PRECAUTIONS ARE ADEQUATE

5 DISCUSSION

If "a goal of education is to help students with issues that they will encounter in current or later life" (Brown et al 1991), then for medical technologists this education must emphasize laboratory safety practices as it is essential that they adhere to these precautions continuously and willingly. The WHO (1992) stipulates that, "the cornerstone of prevention of HIV transmission in the health care setting...must be universal precautions. Routine and/or mandatory testing of either health care workers or patients for HIV antibody is not an effective strategy for controlling HIV transmission in the health care setting and is not recommended." An understanding of the disease and a correct knowledge base is important to medical technologists in their private lives as well, because as sexually active adults, as parents, and as members of their community, their attitudes do influence others.

This study provides an estimate of the extent and kind of change that was produced by a scientifically-based AIDS education programme designed for medical technologists. Overall significant increases in the knowledge of medical technologists about AIDS and HIV infection were demonstrated after education, particularly in the fields of scientific knowledge, HIV diagnosis and laboratory safety practices.

The changes in knowledge in Groups 1 and 2 were similar which indicates that the intervention was consistent.

Significant changes in the overall perceptions of the medical technologists also occurred, though mainly in Group 1. Group 2 showed a heightened precourse perception. This could be due to experimental contamination as the participants evidently discussed the course with their colleagues in the laboratory. In this instance any discussion was welcomed as an additional means of stimulating interest and debate in the subject of AIDS and HIV infection.

Most AIDS programmes concentrate on educating their target audiences about the ways in which the HIV virus can be transmitted, and the clinical results of infection. Knowledge of these aspects among these medical technologists was high before the course; little improvement was possible and therefore could not occur. Their knowledge appears to have been gained through reading medical journals and information leaflets, as it was indicated that "a lot" of information had been gleaned from these sources.

Some areas of confusion and uncertainty were still evident. The current scientific belief is that the virus cannot be spread through holding hands or kissing, nor can infection be obtained from using toilet seats (WHO 1989). However the heightened realization of the medical technologists that the virus can be found in most body fluids may account for their increased perception of being at risk of contracting HIV

infection during social contact, if, for example, the infected person had open sores or cuts on his/her hands, lips or genital area. Also after learning about the window period, the period during which antibodies may not be detected in serological assays, many perceived receiving blood through transfusions as a high risk activity. Donating blood was also seen by some as a risk factor in the transmission of HIV, clearly an erroneous belief, but one which other researchers also have noted (Brown et al 1991).

Most AIDS education programmes emphasize the sexual route of transmission, but in Africa vertical transmission from mother to child is an ever increasingly important way in which the virus is disseminated. This mode of transmission was stressed in the course because medical technologists as parents should appreciate the consequences their actions could have on their families. Babies born to HIV-infected mothers have a 25-40% chance of being infected before or during birth. Infected children will almost certainly die before the age of five, but even if not infected, they will become "AIDS orphans" on the death of their HIV positive parents.

Both before and after the course most of the participants correctly answered a closed choice question dealing with the various routes of transmission, but in a later open-ended question on the same topic, few mentioned this important route of vertical transmission. This example clearly shows

how results may be biased if only closed choice questions are used. Brown et al (1991) also found that positively worded questionnaire items were more frequently endorsed than negatively worded ones. They speculated that students may learn to identify the correct pro-social responses while their attitudes remain unchanged. Govender et al (1992) state that the accurate assessment of knowledge, attitudes and practices related to AIDS is fraught with difficulty, and a discrepancy between knowledge and practice is a common finding. Future researchers should consider using more open-ended questions to probe perceptions and understanding. Even though the answers may prove difficult to analyse a more accurate assessment might be obtained.

Significant increases in knowledge occurred when the medical technologists learnt that the HIV virus can be found in any body fluid that contains white blood cells. These fluids, which include blood, saliva, urine, breast milk, semen, cerebrospinal fluid, cervical or vaginal secretions and bone marrow, are the type of specimens that medical technologists process daily. The WHO (1992) states that universal precautions in health care settings are based on the assumption that all blood is potentially infectious, whether the laboratory results of that person are known or not. These precautions, in the light of the above, should extend to all specimens, not only to blood specimens, and,

reassuringly, many of the medical technologists after the course stated, in an open-ended question, that they were being more careful in the laboratory.

While the concentration of virus might be high in blood, in most other body fluids it is low, and intact skin provides a good protective barrier. But if cuts, or penetrating injuries, such as needlesticks, occur there may be a risk of infection. This risk is low, only 0,4% (Evian 1991), a fact not realized by most of the medical technologists, who before the course rated the possibility of infection by this route to be much higher.

During the laboratory demonstrations other safety precautions were demonstrated and discussed. These included handwashing, the careful handling of sharp objects, aseptic techniques, sterilization/disinfection or disposal procedures, and the use of appropriate safety clothing such as gloves, masks and gowns (WHO 1992). The knowledge of the medical technologists about laboratory safety procedures did increase and some behavioural change was noted as there was a significant increase in the number of those who stated that they now wore gloves when handling specimens. But there is room for a great deal of improvement, especially in their knowledge and understanding of the methods for the adequate disinfection and disposal of specimens and waste washings from assays. Medical technologists often may not be involved in the final

disposal of specimen material, but they should be aware of these procedures and be able to supervise that they are carried out safely and effectively. Future courses could be extended by one or two sessions to give greater emphasis to these areas through practical exercises, and the relevance of these aspects to medical technologists in the different laboratories could be stressed during discussions.

Few of the medical technologists had any experience of HIV diagnosis, therefore it was understandable that their knowledge scores were not high before the course. However the realization that only 28,9% of them understood the difference between the sensitivity and specificity of serological assays is disturbing. These are general diagnostic principles that should be addressed during their laboratory training.

Before and even after the course, few of the medical technologists realized that retroviruses could be found in other animals besides man and monkeys. Scientists have long known that retroviruses infect animals such as monkeys, cats, birds and horses, and as part of the natural world man can be infected by agents similar to those found in animals. These infectious agents often evolve symbiotically with their hosts, causing little or no evident illness. However if this relationship is disturbed, viruses have been shown to "jump"

species with disastrous effects for the new host (McClure 1990). No one can be certain about the origin of the HIV virus, but at the end of the course, half of the participants were able to name one or more of the theories about the origin of this virus. An understanding of these relationships was deemed important as, with greater insight, the participants would be able to more fully appreciate the complexity of the problems facing scientists and this would help them avoid making simplistic solutions. Also by having the correct facts would enable them to make informed decisions about their own behaviour.

Changes in the perceptions of AIDS, although significant, were not as dramatic. In general there was little change in the perception of the importance of AIDS, but this could be expected as these medical technologists had expressed their interest in this virus by volunteering to participate in the course, and therefore already regarded the subject as important.

Bury (1991) found that even when people are well informed, AIDS is perceived as something that happens to someone else, and Matthews et al (1990) also highlighted the importance of making people aware that AIDS is their problem, not somebody elses. This course endeavoured to overcome this lack of relevance and to enhance the feeling of personal vulnerability, by specifically designing the educational message for medical technologists. Only three of the medical

technologists who participated in these two courses knew someone with AIDS so initially personal relevance was not high.

Most participants recognized that they were at risk of contracting HIV infection when handling specimens at work and stated they had changed in their attitude towards the practice of laboratory safety. Several also indicated that their attitude towards their sexual relationships had changed. Judging from these answers it appears that the disease has become a personal reality for these medical technologists.

A few stated that they felt threatened. Examples of over-reaction among health professionals have been described (Moynihan 1991). These range from surgeons refusing to operate on HIV positive patients to laboratory personnel demanding highly protective environments. However provided that safety precautions are observed health professionals are not at high risk, but often their fear may prevent them from acting rationally.

This course was designed primarily to promote laboratory safety, however during the clinical session which was facilitated by two clinicians, sexual practices were discussed openly and honestly. From these discussions it appeared that the dating relationships of the participants did include sexual involvement, and that the use of condoms was not a widespread or usual practice. These medical

technologists were young adults, mainly in their twenties, and their sexual involvements probably started at a younger age. Bury (1991) found that teenagers in Britain were having sexual relationships at an earlier age than previously, and Nyachuru-Sihlangu (1992) reported that Zimbabwian students favoured dating relationships with sexual involvement. Nyachuru-Sihlangu (1992) also found that more males than females thought about AIDS when on a date; a similar finding in this study showed that males were significantly more aware of AIDS than females. Yet during the clinical session several of the participan ., both male and female, stated emphatically that they were involved with one person only; and later in an open-ended question, many claimed to be acting more responsibly in sexual matters now that they had greater insight into the problem. Vener et al (1990) found that increased knowledge may, in some instances, increase complacency. Vener et al were studying American university students who did not consider heterosexual transmission a major threat, and few in this study group indicated changes in sexual habits. This present course focused on the heterosexual spread of AIDS in Africa as the main mode of transmission, as well as on transmission in the laboratory. Therefore the relevance was more apparent and resulted in many of the medical technologists stating that they were more careful in the laboratory and in their sexual relationships.

An important change in attitude towards persons infected with HIV was noted as a result of this course, when medical technologists who before the course definitely wanted to know about HIV positive colleagues, now agreed that their right to privacy should be respected. This indicates that they would now be more accepting of an HIV infected colleague. Similarly Kowaluski (1991) found that although increased knowledge did not alter the perceptions of university students, their attitudes towards HIV infected persons did become more positive and accepting. The WHO (1992) encourages tolerance towards those infected as, "discrimination and stigmatization have been shown over and over again to be counterproductive to slowing the spread of HIV/AIDS". Not only is discrimination a violation of human rights, but it also categorizes and divides communities into "them" and "us" and so enhances personal denial.

But however positive the recorded changes may be, for long term and continued behavioural change, constant reinforcement is necessary. Brown et al (1991) state that while some campaigns have been effective in increasing awareness about the transmission of HIV infection, the weak changes observed after education are not of sufficient magnitude to alter the course of the epidemic. They also maintain that prevention efforts need to occur over time, be broadly focused and repeated regularly.

Education and the dissemination of knowledge is the major weapon in the control of the spread of this disease and in encouraging appropriate responses towards it. A suggestion was made by one of the medical technologists that AIDS education be included in their theoretical syllabus at the Technikon. Whilst some aspects could be incorporated the coverage would be limited as their curriculum is already extensive. This programme which addresses all medical technologists, is being prepared as an accredited short course for presentation at training institutions such as hospitals and technikons.

The number of medical technologists who felt that they knew "a lot" about AIDS/HIV infection did increase after the course, but the improvement in certain areas, such as laboratory safety, was not sufficient and unless this education is constantly reinforced the benefits will not be sustained. One of the best ways to learn and to continue learning, is to teach; therefore it is recommended that these medical technologists become informal educators, educating their colleagues, families and members of their communities. In this way they would keep abreast of current developments through reading, and their knowledge would be constantly reinforced.

ANNEXURES

ANNEXURE A

KNOWLEDGE AND PERCEPTIONS OF MEDICAL TECHNOLOGISTS ABOUT AIDS
QUESTIONNAIRE NO 1

Dear medical technologist,
Please would you complete this questionnaire. Questionnaires are anonymous so do not put your name on it. All information given by you will be regarded as confidential and used for evalutation purposes only. Please indicate your answer [or answers] by making a tick in the appropriate block[s]. Please attempt to answer all questions.

PROFESSIONAL AND PERSONAL DETAILS

1 Age: <20 ☐ 20–29 ☐ 30–39 ☐ >40 ☐

2 Gender: male ☐ female ☐

3 Department: AnatPath ☐ ChemPath ☐ Haem ☐ Micro ☐ Virol ☐

4 Rank: Stud ☐ Qual/Sen ☐ ☐ Principal ☐ Chief ☐ Control ☐

5 Marital status: Single ☐ Married ☐ Separated Divorced ☐ Widow Widower ☐ Living together ☐

6 Children: Yes ☐ No ☐

KNOWLEDGE AND PERCEPTIONS OF AIDS/HIV INFECTION

7 How much do you think you know about AIDS/HIV?
a lot ☐ some ☐ little ☐ nothing ☐

8 Do you know anyone who has AIDS/HIV infection?
yes ☐ no ☐ not sure ☐

9 Do you think you are at risk of catching AIDS/HIV –

i at work when handling specimens?
yes ☐ no ☐ not sure ☐

ii during normal social contact with family/friends?
yes ☐ no ☐ not sure ☐

10 Do you think that all the fuss made about AIDS/HIV infection is:-

necessary	unnecessary
☐	☐

11 Can someone who looks and feels healthy carry the AIDS/HIVirus?

yes	no	not sure
☐	☐	☐

12 How many HIV-infected people will develop AIDS and die?

none	most	all	not sure
☐	☐	☐	☐

13 Do you think that AIDS/HIV infection will spread among the medical technologists at GaRankuwa Hospital and Medunsa because they may work with HIV-infected specimens?

yes	no	not sure
☐	☐	☐

14 Can AIDS/HIV infection can be sexually-transmitted?

yes	no	not sure
☐	☐	☐

15 Do you talk about AIDS/HIV with your friends?

yes	no
☐	☐

16 Do you talk about AIDS/HIV with your family?

yes	no
☐	☐

17 How serious a disease do you consider AIDS/HIV to be?

very	fairly	not serious	not sure
☐	☐	☐	☐

18 Can the HIVirus be transmitted by a healthy carrier of the virus?

yes	no	not sure
☐	☐	☐

19 Can a mother give the HIVirus to her unborn child?

yes	no	not sure
☐	☐	☐

20 Has the HIVirus been detected in:-

	yes	no	not sure
blood?	☐	☐	☐
saliva?	☐	☐	☐
urine?	☐	☐	☐
sex?	☐	☐	☐
breast milk?	☐	☐	☐
stool?	☐	☐	☐

21 Is there a vaccine available against AIDS/HIV infection?

yes	no	not sure
☐	☐	☐

22 Can AIDS be cured?

yes	no	not sure
☐	☐	☐

23 In the laboratory should safety precautions be taken wit'

	yes	no	not sure
formalin-fixed specimens?	☐	☐	☐
specimens labelled as biohazard?	☐	☐	☐
any specimen?	☐	☐	☐

24 Do you wear gloves when handling specimens?

yes	no	sometimes
☐	☐	☐

25 If a medical technologist tested HIV positive, do you think that:-

i 'is/her work colleagu» ɔ should be informed of this?

yes	no	not sure
☐	☐	☐

ii s/he should continue working in the laboratory?

yes	no	not sure
☐	☐	☐

iii if the infected medical technologist did continue working in the laboratory, what sort of work should this person do?

26 If a close friend of yours tells you s/he is infected with the HIVirus, how do you think you would react? Would you:-

i remain as friendly as before?

yes	no	not sure
☐	☐	☐

ii remain friendly but avoid any physical contact?

yes	no	not sure
☐	☐	☐

iii cool the friendship?

yes	no	not sure
☐	☐	☐

iv avoid him/her?

yes	no	not sure
☐	☐	☐

27 Where did you learn about AIDS?

		a lot	something	nothing
i	radio	☐	☐	☐
ii	television	☐	☐	☐
iii	newspapers	☐	☐	☐
iv	magazines	☐	☐	☐
v	information leaflets	☐	☐	☐
vi	telephone hot-lines	☐	☐	☐
vii	medical literature	☐	☐	☐

28 Do you think there is a risk of transmitting the HIVirus by or from:-

		high risk	slight risk	no risk
i	holding hands?	☐	☐	☐
ii	kissing on the cheek?	☐	☐	☐
iii	open-mouth kissing?	☐	☐	☐
iv	sharing cups or food?	☐	☐	☐
v	sex with many different partners?	☐	☐	☐
vi	mosquito bites?	☐	☐	☐
vii	donating blood?	☐	☐	☐
viii	receiving blood?	☐	☐	☐
ix	toilet seats?	☐	☐	☐
x	accidents, eg needlepricks or cuts?	☐	☐	☐

29 How do you think AIDS awareness among medical technologists could be increased?

30 Is there anything that you particularly want to know about AIDS?

31 How is HIV infection usually diagnosed? by detection of:-

antibody	antigen	not sure
☐	☐	☐

32 Can HIV antibodies be detected:-

		yes	no	not sure
i	immediately after exposure?	☐	☐	☐
ii	2-3 weeks after exposure?	☐	☐	☐
iii	only 3-5 years after exposure?	☐	☐	☐

33 What is meant by the "window period?"

35 Does the presence of HIV antibodies in a seemingly-healthy person indicate that:-

		yes	no	not sure
i	they have immunity against AIDS?	☐	☐	☐
ii	they are capable of transmitting the virus?	☐	☐	☐
iii	they have the disease of AIDS?	☐	☐	☐

36 If a newborn baby has HIV antibodies, is the baby infected with the virus?

yes ☐ no ☐ not sure ☐

37 Do you think that the safety precautions are adequate in your laboratory?

yes ☐ no ☐ not sure ☐

38 Why do you think it is important for you to know about AIDS/HIV?

39 Do you think that courses about AIDS/HIV specifically for medical technologists are necessary?

yes ☐ no ☐ not sure ☐

40 How do you dispose of these specimens or products in your particular laboratory?

i blood

ii CSF, urines and other body fluids

iii tissues or stools

iv buffers and solutions used in assays

v waste washing liquids from assays

41 What are the main routes of transmission of HIVirus?

42 Approximately how many people are infected with the HIVirus worldwide:-

		5	10	20	40	80 million
i	now in July 1992?	☐	☐	☐	☐	☐
ii	will be by the year 2000?	☐	☐	☐	☐	☐

43 In South Africa is AID/HIV infection predominately a disease of:-
homosexuals? ☐ heterosexuals? ☐

44 Are similar diseases/viruses found in other animals, such as:-

		yes	no	not sure
i	monkeys?	☐	☐	☐
ii	cats?	☐	☐	☐
iii	horses?	☐	☐	☐
iv	birds?	☐	☐	☐
v	frogs?	☐	☐	☐
vi	insects?	☐	☐	☐

45 In which cells can the virus infect and replicate?

		yes	no	not sure
i	lymphocytes?	☐	☐	☐
ii	erythrocytes?	☐	☐	☐
iii	macrophages?	☐	☐	☐
iv	glial cells?	☐	☐	☐
v	osteocytes?	☐	☐	☐

46 What do these abbreviations stand for:-
i AIDS?
ii HIV?

47 Do you think that the safety precautions taken in your laboratory will protect you against infection with HIVirus?
yes ☐ no ☐ not sure ☐

48 Can you suggest how the safety precautions used in your laboratory can be improved?

49 Would you be willing to be tested for AIDS/HIV?
yes ☐ no ☐

50 Where do you think the HIVirus came from?

51 What tests could you do in your laboratory to help establish a diagnosis of AIDS/HIV infection?

52 What would you do if you accidentally pricked yourself with a needle containing blood from a patient?

53 What is the risk of HIV transmission by needlestick injuries?

100%	40%	4%	0,4%
☐	☐	☐	☐

54 Do you think that HIV causes AIDS?

yes	no	not sure
☐	☐	☐

55 What screening assays are used for HIV diagnosis?

56 In serological screening assays would it be better to have - high sensitivity or high specificity?

☐ ☐

THE END

Thank you for your time and honesty,
your input will be extremely valuable when planning future courses.

ANNEXURE B

KNOWLEDGE AND PERCEPTIONS OF MEDICAL TECHNOLOGISTS ABOUT AIDS
QUESTIONNAIRE NO 2

Dear medical technologist,
Thank you for attending this course. I hope you have enjoyed it as much as I have, and have gained from it. Please would you complete this questionnaire, all the information given by you will be regarded as confidential and used for evalutation purposes only. Questionnaires are anonymous so do not put your name on it. Please indicate your answer [or answers] by making a tick in the appropriate block[s]. Please attempt to answer all questions.

PROFESSIONAL AND PERSONAL DETAILS

1 Age — <20 ☐ 20-29 ☐ 30-39 ☐ >40 ☐

2 Gender — male ☐ female ☐

3 Department — AnatPath ☐ ChemPath ☐ Haem ☐ Micro ☐ Virol ☐

4 Rank — Student ☐ Qual/Sen/Principal ☐ ☐ Chief/Control/Other ☐ ☐ ☐

5 Marital status — Single ☐ Married ☐ Separated Divorced ☐ Widow Widower ☐ Living together ☐

6 Children — Yes ☐ No ☐

KNOWLEDGE AND PERCEPTIONS OF AIDS/HIV INFECTION

7 How much do you think you know about AIDS/HIV?
a lot ☐ some ☐ little ☐ nothing ☐

8 Do you think you are at risk of catching AIDS/HIV -

i at work when handling specimens?
yes ☐ no ☐ not sure ☐

ii during normal social contact with family/friends?
yes ☐ no ☐ not sure ☐

9 Do you think that all the fuss made about AIDS/HIV infection is:-

necessary ☐ unnecessary ☐

10 Can someone who looks and feels healthy carry the AIDS/HIVirus?

yes ☐ no ☐ not sure ☐

11 How many HIV-infected people will develop AIDS and die?

none ☐ most ☐ all ☐ not sure ☐

12 Do you think that AIDS/HIV infection will spread among the medical technologists at GaRankuwa Hospital and Medunsa because they may work with HIV-infected specimens?

yes ☐ no ☐ not sure ☐

13 How has your new understanding of AIDS/HIV infection affected your attitude towards practicing laboratory safety precautions?

14 Can AIDS/HIV infection can be sexually-transmitted?

yes ☐ no ☐ not sure ☐

15 Have you tried to talk to others about AIDS now that you know more about the disease? yes ☐ no ☐

16 If yes, were they interested to hear what you had to say?

yes ☐ no ☐

17 How serious a disease do you consider AIDS/HIV to be?

very ☐ fairly ☐ not serious ☐ not sure ☐

18 Can the HIVirus be transmitted by a healthy carrier of the virus?

yes ☐ no ☐ not sure ☐

19 Can a mother infect her unborn child with the HIVirus?

yes ☐ no ☐ not sure ☐

20 Has the HIVirus been detected in:-

	yes	no	not sure
blood?			
saliva?			
urine?			
semen?			
breast milk?			
stool?			

21 Is there a vaccine available against AIDS/HIV infection?

yes ☐ no ☐ not sure ☐

22 Can AIDS be cured? yes ☐ no ☐ not sure ☐

23 In the laboratory should safety precautions be taken with:-

	yes	no	not sure
formalin-fixed specimens?	☐	☐	☐
specimens labelled as biohazard?	☐	☐	☐
any specimen?	☐	☐	☐

24 Do you wear gloves when handling specimens?

yes ☐ no ☐ sometimes ☐

25 If a medical technologist tested HIV positive, do you think that:-

i his/her work colleagues should be informed of this?

yes ☐ no ☐ not sure ☐

ii s/he should continue working in the laboratory?

yes ☐ no ☐ not sure ☐

iii if the infected medical technologist did continue working in the laboratory, what sort of work should this person do?

26 If a close friend of yours tells you s/he is infected with the HIVirus, how do you think you would react? Would you:-

i remain as friendly as before? yes ☐ no ☐ not sure ☐

ii remain friendly but avoid physical contact? yes ☐ no ☐ not sure ☐

iii cool the friendship? yes ☐ no ☐ not sure ☐

iv aviod him/her? yes ☐ no ☐ not sure ☐

27 Has your new knowledge of AIDS/HIV infection affected your way of life? yes ☐ no ☐

If yes, how?

28 Do you think there is a risk of transmiting the HIVirus by or from:-

	high risk	slight risk	no risk
i holding hands?			
ii kissing on the cheek?			
iii open-mouth kissing?			
iv sharing cups or food?			
v sex with many different partners?			
vi mosquito bites?			
vii donating blood?			
viii receiving blood?			
ix toilet seats?			
x accidents, eg needlepricks or cuts?			

29 How do you think AIDS awareness among medical technologists could be increased?

30 Was there anything that you particularly wanted to know about AIDS/HIV infection that was not dealt with in the course?

31 HIV infection is usually diagnosed by detection of:-

antibody? ☐ antigen? ☐

32 Can HIV antibodies be detected:-

		yes	no	sometimes
i	immediately after exposure?	☐	☐	☐
ii	2-3 weeks after exposure?	☐	☐	☐
iii	only 3-5 years after exposure?	☐	☐	☐

33 What is meant by the "window period?"

35 Does the presence of HIV antibodies in a seemingly-healthy person indicate that:-

		yes	no	not sure
i	they have immunity against AIDS?	☐	☐	☐
ii	they are capable of transmitting the virus?	☐	☐	☐
iii	they have the disease of AIDS?	☐	☐	☐

36 If a newborn baby has HIV antibodies does this mean that the baby is infected with the virus? yes ☐ no ☐ not sure ☐

37 Do you consider the safety precautions adequate in your laboratory? yes ☐ no ☐ not sure ☐

38 Why do you think it is important for you to know about AIDS/HIV?

39 Do you think that courses about AIDS/HIV specifically for medical technologists are necessary? yes ☐ no ☐ not sure ☐

40 How do you dispose of these specimens or products in your particular laboratory?

i blood

ii CSF, urines and other body fluids

iii tissues or stools

iv buffers and solutions used in assays

v waste washing liquids from assays

41 What are the main routes of transmission of HIVirus?

42 Approximately how many people are/will be infected with the HIVirus worldwide:-

	5	10	20	40	80 million
i now in 1992?	☐	☐	☐	☐	☐
ii by the year 2000?	☐	☐	☐	☐	☐

43 In South Africa is AIDS/HIV infection predominately a disease of homosexuals or heterosexuals?

☐ ☐

44 Are similar diseases/viruses found in other animals, such as:-

		yes	no	not sure
i	monkeys?	☐	☐	☐
ii	cats?	☐	☐	☐
iii	horses?	☐	☐	☐
iv	birds?	☐	☐	☐
v	frogs?	☐	☐	☐
vi	insects?	☐	☐	☐

45 Which cells can the virus infect and replicate in?

		yes	no	not sure
i	lymphocytes?	☐	☐	☐
ii	erythrocytes?	☐	☐	☐
iii	macrophages?	☐	☐	☐
iv	glial cells?	☐	☐	☐
v	osteocytes?	☐	☐	☐

46 Write out these abbreviations in full:-
AIDS?
HIV?
ARC?

47 Do you think that the safety precautions taken in your laboratory will protect you against infection with HIVirus?

yes	no	not sure
☐	☐	☐

48 Can you suggest at least two ways in which the safety precautions could be improved in your laboratory?

49 Would you be willing to be tested for AIDS/HIV? yes ☐ no ☐

50 Where do you think the HIVirus came from?

51 What tests could you do in your laboratory to help establish a diagnosis of AIDS/HIV infection?

52 What would you do if you accidentally pricked yourself with a needle containing blood from a patient?

53 What is the risk of HIV transmission by needlestick injuries?

100% ☐ 40% ☐ 4% ☐ 0,4% ☐

54 Do you think that HIV causes AIDS? yes ☐ no ☐ not sure ☐

55 What screening assays are used for HIV diagnosis?

56 In serological screening assays would it be better to aim for - sensitivity ☐ or specificity? ☐

57 What confirmatory test is done for [illegible] diagnosis?

58 How did you find the scientific standard of this course?

too high ☐
reasonable ☐
moderate ☐
too low ☐

59 Do you have any suggestions that could improve future courses?

THE END

Thank you for your time and honesty,
your input will be extremely valuable in planning future courses.

ANNEXURE C

SCIENTIFIC KNOWLEDGE ABOUT AIDS AND HIV

QUESTION POSED	SCORE yes	no	n/s
Has the HIVirus been detected in:-			
blood?	2	0	0
saliva?	2	0	0
urine?	2	0	0
semen?	2	0	0
breast milk?	2	0	0
stool?	0	2	0
Can HIV antibodies be detected:-			
immediately after infection?	0	2	0
2 - 3 weeks after infection?	2	0	0
only 3 - 5 years after infection?	2	0	0
What is meant by the "window period?" the time from infection to the appearance of antibodies	2		
Does the presence of HIV antibodies in a seemingly-healthy person indicate that:-			
they have immunity against AIDS?	0	2	0
they are capable of transmitting the virus?	2	0	0
they have the disease of AIDS?	0	2	0
Are similar diseases/viruses found in other animals, such as:- monkeys?	2	0	0
cats?	2	0	0
horses?	2	0	0
birds?	2	0	0
frogs?	1	1	2
insects?	1	1	2
Which cells can the virus infect and replicate in? lymphocytes?	2	0	0
erythrocytes?	2	0	0
macrophages?	2	0	0
glial cells?	2	0	0
osteocytes?	1	1	2
What do the abbreviations stand for:-			
AIDS? Acquired Immunodeficiency Syndrome	2		
HIV? Human Immunodeficiency Virus	2		
ARC? AIDS-related complex	2		
Where do you think the HIV virus came from? reasonable scientific theory	2 per theory, 6 maximum		
Do you think HIV causes AIDS?	2	1	0

MAXIMUM SCORE: Questionnaire No 1 = 50
Questionnaire No 2 = 62.

KNOWLEDGE ABOUT THE TRANSMISSION OF HIV INFECTION

QUESTION POSED	SCORE yes	no	n/s
Do you think you are at risk of catching AIDS/HIV infection:-			
at work when handling specimens?	2	1	0
at home during normal social contact?	0	2	0
Can AIDS/HIV infection be sexually-transmitted?	2	0	0
Can AIDS/HIV infection be transmitted by a healthy carrier of the virus?	2	0	0
Can a mother give the HIVirus to her unborn child?	2	0	0

Do you think there is a risk of transmitting the HIVirus by or from:-	high	slight	none
holding hands?	0	0	2
kissing on the cheek?	0	0	2
open-mouth kissing	0	2	0
sharing cups and utensils?	0	0	2
having sex with many people?	2	0	0
mosquito bites?	0	1	2
donating blood?	0	0	2
receiving blood?	1	2	0
toilet seats?	0	1	2
needleprick accidents?	1	2	0

What are the main routes of transmission of the HIV virus? [open-ended question]

sexual	2 marks
parenteral	2 marks
blood transfusion	1 mark
IV drug abuse.	1 mark
vertical	2 marks

What is the risk of transmission via a needlestick accident? 0,4% ..... 2 marks

MAXIMUM SCORE: Questionnaire No 1 = 38
Questionnaire No 2 = 38

CLINICAL AND EPIDEMIOLOGICAL KNOWLEDGE OF AIDS/HIV INFECTION

QUESTION POSED	SCORE yes	no	n/s
Can someone who looks and feels healthy carry the AIDS/HIV virus?	2	0	0

	most /all	none	n/s
How many HIV-infected people will develop AIDS and die?	2	0	0

	yes	no	n/s
Is there a vaccine available against AIDS/HIV infection?	0	2	0
Can AIDS be cured?	0	2	0

Approximately how many people are infected with AIDS/HIV worldwide:-

now in July 1992? = 10 million..... 2 marks
will be by the year 2000? = 40 million ..... 2 marks

In South Africa is AIDS predominantly a disease of:-

homosexuals?.....0 marks
heterosexuals?.....2 marks

MAXIMUM SCORE: Questionnaire No 1 = 14
Questionnaire No 2 = 14

KNOWLEDGE ABOUT LABORATORY SAFETY PROCEDURES

QUESTION	SCORE yes	no	n/s
In the laboratory should safety precautions be taken with:- formalin-fixed specimens?	2	0	0
biohazard-labelled specimens?	2	0	0
any specimen?	2	0	0

	yes	some-times	no
Do you wear gloves when handling specimens?	2	1	0

How do you dispose of the following in your laboratory:- [open-ended]	Autoclave Incinerate	Disinfect	Other
blood?	2	1	0
CSF?	2	1	0
tissues and/or stools?	2	1	0
buffers and/or solutions?	2	2	0
waste liquids?	2	2	0

	yes	no	n/s
Do you think that the safety precautions taken in your laboratory will protect you against infection with HIVirus?	2	1	0

What would you do if you accidentally pricked yourself with a needle containing blood from a patient? [open-ended]

within the hour one should:-

- make the wound bleed, wash and disinfect it.....2 marks
- report accident to a senior, [written].....2 marks
- test one's own serum for HIV, and.....2 marks
- test the patient's serum for HIV.....2 marks
- request AZT within one hour if necessary.....2 marks

maximum = 10

MAXIMUM SCORE: Questionnaire No 1 = 30
Questionnaire No 2 = 30

KNOWLEDGE ABOUT
THE LABORATORY DIAGNOSIS OF HIV INFECTION

QUESTION		SCORE
HIV infection is usually diagnosed by the detection of:-	antibody?.....	2 marks
	antigen?.....	0
What tests could you do in your laboratory to help establish a diagnosis of HIV infection?..... [open-ended]		2 marks/test 4 = maximum
What screening assays are used for HIV diagnosis?..... [open-ended]		2 marks/test 4 = maximum
In screening assays would it be better to have higher:-	sensitivity?.....	2 marks
	specificity?.....	0
What confirmatory tests are done for HIV diagnosis?... [open-ended in Q2 only]		2 marks/test 4 = maximum

MAXIMUM SCORE: Questionnaire No 1 = 12
Questionnaire No 2 = 16

ANNEXURE D

PERCEPTIONS: AWARENESS OF AIDS

QUESTION POSED		SCORE
How much do you think you know about AIDS/HIV?		3: a lot 2: some 1: little 0: nothing
Do you talk about AIDS with your friends?		2: yes 0: no
Do you talk about AIDS with your family?		2: yes 0: no
Where did you learn about AIDS/HIV infection? [Questionnaire 1 only]	radio? TV? newspapers? magazines? information leaflets? telephone hotlines? medical literature?	2: a lot 1: something 0: nothing
How do you think AIDS awareness could be increased among medical technologists? [open-ended question]		3: education 2: see patients 1: stress lab safety 0: no answer 6: maximum

Educational activities suggested included:-
courses, symposia, lectures, posters, pamphlets.

MAXIMUM SCORE: Questionnaire No 1 = 27
Questionnaire No 2 = 13

PERCEPTIONS OF THE IMPORTANCE OF AIDS

QUESTION	SCORE
Do you think that all the fuss made about AIDS/HIV infection is necessary?	2: necessary 0: unnecessary
How serious a disease do you consider AIDS/HIV infection to be?	3: very 2: fairly 1: not serious 0: not sure

Is there anything that you particularly want to know about AIDS/HIV infection?
[open-ended question in Questionnaire 1]

- all about the virus..... 3
- about a cure or vaccine..... 2
- about laboratory diagnosis &/or patient counselling..... 1
- that it is a myth, or no answer..... 0

Was there anything that you particularly wanted to know about AIDS/HIV infection that was not dealt with in the course?
[open-ended question in Questionnaire 2]

- everything was covered, nothing..... 3
- costs of laboratory tests and patient care..... 2
- no..... 1
- no answer..... 0

Why do you think it is important for you to know about AIDS/HIV infection?
[open-ended question]

- to educate others..... 3
- to protect oneself..... 2
- to be able to deal with people with AIDS..... 1
- no answer..... 0

Do you think that courses about AIDS/HIV infection..... 2: yes
specifically for medical technologists, are necessary?.... 1: no
..... 0: n/s

Has your new knowledge of AIDS/HIV infection..... 2: yes
affected your way of life?..... 1: no
[open-ended question in Questionnaire 2]..... 0: n/s

If yes, how? [open-ended question in Questionnaire 2]

- take more care, especially in the laboratory..... 3
- more responsible about sex..... 2
- feel threatened..... 1
- no answer..... 0

maximum..... 6

MAXIMUM SCORE Questionnaire No 1 = 19
Questionnaire No 2 = 27

ATTITUDE TOWARDS PERSONS WITH AIDS/HIV INFECTION

QUESTION	SCORE yes	no	n/s
If a medical technologist tested HIV positive, do you think that his/her work colleagues should be informed of this?	1	2	0
If a medical technologist tested HIV positive, should s/he continue working in the laboratory?.....	2	1	0
If the infected medical technologist did continue working in the laboratory, what sort of work should s/he do? [open-ended question]			
continue with normal duties.....	3		
change to clerical [non-bench] duties.....	2		
terminate services.....	1		
no answer.....	0		
If a close friend of yours tells you s/he is infected with HIV, how would you react? Would you:-			
. remain as friendly as before?.....	2	1	0
. remain friendly but avoid any physical contact?.....	1	2	0
. cool the friendship?.....	1	2	0
. avoid him or her?.....	1	2	0
Would you be willing to be tested for HIV?.....	2	0	

MAXIMUM SCORE Questionnaire 1 = 17
Questionnaire 2 = 17

PERCEPTIONS OF LABORATORY SAFETY

QUESTION	SCORE yes	no	n/s
Do you think you are at risk of catching AIDS/HIV infection at work when handling specimens?.....	2	1	0
Do you think that AIDS/HIV infection will spread among medical technologists at GaRankuwa Hospital and Medunsa because they may work with HIV-infected specimens?.....	1	2	0
Can you suggest how the safety precautions used in your laboratory can be improved? [open-ended question]	each suggestion.... 2 marks maximum..... 4 marks		
Do you think that the safety precautions are adequate in your laboratory?.....	2	1	0

How has your new understanding of AIDS/HIV infection affected your attitude towards practicing laboratory safety precautions?
[open-ended question in Questionnaire 2]

- more one more careful..... 3
- no answer..... 0

MAXIMUM SCORE: Questionnaire 1 = 10
Questionnaire 2 = 13



ANNEXURE E

AIDS EDUCATIONAL PROGRAMME FOR MEDICAL TECHNOLOGISTS

SESSION ONE: INTRODUCTION TO VIRUSES
Introduction: course outlined;
Questionnaire 1: completed by all participants;
Mini-lecture: "What is a virus?"
Video: "What caused the epidemic?"
Reflective exercise.

SESSION TWOa: RETROVIRUSES
Lecture: Retroviruses;
Video: Case history of an HIV-infected patient;
Small group exercise.

SESSION TWOb: VIRAL MORPHOLOGY AND DISINFECTION
Demonstrations: viral morphology and electron microscopy;
laboratory decontamination and sterilization;
laboratory safety practices.
Clinical aspects of HIV.

SESSION THREE: CLINICAL ASPECTS OF AIDS/HIV INFECTION
Visit to GaRankuwa Hospital:
Class discussion: clinical stages and symptoms of AIDS;
the treatment and care of AIDS patients;
hospital policy regarding accidental exposure to AIDS.
Role-play: AIDS counselling, confidentiality of reports.

SESSION FOUR: **TRANSMISSION OF AIDS/HIV INFECTION**

Small-group work: HIV transmission;

Class report back: and discussion;

Video/tutorial: laboratory diagnosis of HIV infection.

SESSION FIVE: **LABORATORY DIAGNOSIS OF HIV INFECTION**

SAIMR Serology laboratory:

Demonstration: screening and confirmatory assays used for diagnosing HIV infection.

Safety procedures and precautions again emphasized.

SESSION SIX: **RESEARCH THEORIES AND QUESTIONS**

Lecture: possible origins of AIDS;
vaccine possibilities.

Questionnaire 2: completed;

Certificates of attendance presented.

SESSION ONE: INTRODUCTION TO VIRUSES

Introduction and welcome: the format of the course was outlined and, in a mood-setting talk, the seriousness of the AIDS epidemic and its relevance to the participants was emphasized.
Questionnaire No 1: completed by all participants to ascertain their precourse knowledge.

Tea break: 15 minutes.
Tea and biscuits were kindly donated by a commercial firm.

Illustrated lecture: "What is a virus?" described the properties of viruses which are totally unlike any other forms of life. Viruses have characteristics of living organisms, such as the ability to replicate, but only within living cells. Under certain circumstances they can also form crystalline arrays, a characteristic of complex chemical molecules. These unique characteristics of viruses including their size, structure and replication were explained using electron micrographs of negatively-stained virions, together with flow diagrams on overhead transparencies.

Video: a BBC documentary described how AIDS as a new disease was first recognized by workers at the Centre of Disease Control in the United States. One of the co-discoverers of the HIV virus, Dr Robert Gallo explained why he thought the causative agent would be a virus, and a retrovirus in particular; while Dr Luc Montagnier described how he actually discovered the HIV virus and the subsequent search for a suitable cell line in which to propagate it.

A reflective exercise on various aspects covered during the session was then completed by the learners to probe their understanding.

Questions posed were:-

1 What did you find most interesting about viruses?

2 Can you name three ways in which viruses differ from bacteria?

3 Can you remember some of the laboratory safety measures/ precautions taken by the laboratory workers in the video? Could you improve upon these?

4 What made scientists in America realize that they were facing a new epidemic?

5 The AIDS virus is now called HIV, or Human Immunodeficiency Virus. Can you remember the orignial names that Luc Montagnier and Robert Gallo gave to their isolated AIDS viruses?

Selected readings were presented to the participants in the form of a manual. Those selected to compliment this lecture included:

1 Evian C. The nature of the AIDS epidemic and the disease itself, Chap. 2 in "AIDS in the Workplace" Goldfields Press, Halfway House, South Africa. 1991.

2 Schoub B.D. AIDS in South Africa - into the second decade. S.Afr. Med. J. 81 55-56, 1992.

Illustrated lecture: "Retroviruses" discussed the unique characteristics of the retroviridae family, especially their ability to reverse the normal biochemical processes which enables these viruses to form DNA from their RNA genome. The newly formed viral DNA is then integrated into the host cell genome where it remains for life. The three main groups of retroviruses and the five known human retroviruses, including HIV-1 and HIV-2, were introduced. The morphology, genetics, replication and pathogenesis of HIV-1 was explored and links made to the previous lecture on viruses in Session 1.
Class discussion: the significance of virus integration was stressed and reference was made to the types of laboratory techniques and safety precautions which would safeguard medical technologists against this infection.

Tea break

Video: a video documentary highlighted certain clinical and therapeutic aspects of this disease by describing the case history of a nurse who had contracted HIV infection through a contaminated blood transfusion. Her treatment with AZT during a drug trial was followed. Thereafter some possible approaches to the development of an AIDS vaccine were outlined. These included subunit vaccines as well as the use of virus vectors and recombinant virus vaccines.

Small-group exercise: each small group of medical technologists were asked to formulate a research question on an aspect of HIV that was of particular interest to them. While these questions were discussed as a group, they wrote up their final question individually.

Selected readings for Session Two[a] included:-

1 Allain J.P. Retrovirus learning guide. Abbott Diagnostics Educational Services. 1988.

2 Brown P AIDS the challenge of the future. New Scientist Suppl 54, 1-4, 18-4-92.

3 Evian C. AIDS - the basic and essential information, Chap. 1 in "AIDS in the Workplace" Goldfields Press, Halfway House, South Africa. 1991.

SESSION TWOb: LABORATORY DEMONSTRATIONS

For this session the class was divided into three groups, each group then rotated through the following laboratory demonstrations:-

1 **Electron microscopy and viral morphology:** the development of the electron microscope was outlined, and the optical principles explained by comparing these to those of the light microscope. Specimen preparation was demonstrated and virus particles were viewed in the electron microscope as well as in micrographs.

2 **Laboratory sterilization and disinfectant methods** used for the disposal of specimens, cleaning of work surfaces and equipment were demonstrated, and the principles of their action explained. Methods demonstrated included autoclaving, incineration, as well as the use of various chemical disinfectants.

3 **Laboratory safety procedures and clothing** was demonstrated. The wearing of gloves, gowns, overshoes and, when necessary, masks was shown, and aseptic techniques which should be used when handling specimens was taught. The importance of these procedures for all laboratory workers who come into contact with biological materials was stressed.

Tea break

Clinical aspects of HIV infection: an introductory tutorial described the various stages in the progression to clinical disease. These were discussed with reference to the integration of the virus and its genetic regulation. The clinical implications in the detection of HIV antigen and antibody in the patient's serum also was described. Other diagnostic problems, such as those posed by the window period, the presence of maternal antibody in the neonate, and possible viral mutation were also discussed.

Readings selected for this session included:-

1 Information leaflet: "Precautions for persons who handle potentially infectious materials in the laboratory, clinic, hospital ward, and blood bank."

2 Dudley H.A.F. Bloodborne infection in the workplace. Br. Med. J. 299, 16-9-89.

3 Aouin H. When a house officer gets AIDS. New Eng. J. Med. 693-696, 7-9-89.

SESSION THREE: CLINICAL ASPECTS OF AIDS/HIV INFECTION

Two clinicians facilitiated this session during which the group visited GaRankuwa Hospital.

Case presentations: Clinical case histories of health care workers, such as doctors, nurses, porters and radio-graphers, who had contracted HIV infection were presented. Their symptoms, probable mode of infection and prognosis were outlined by the clinicians.

Discussion: A lively class discussion followed on the modes of transmission of HIV infection, and on various clinical and social aspects of AIDS and HIV infection. The policies to be followed at GaRankuwa Hospital after the accidental exposure of staff to HIV infection were outlined.

Role play: A clinician and a medical technologist demonstrated how HIV infected persons are counselled before and after testing.

Discussion: Societal attitudes towards HIV-infected persons were explored, and laboratory ethics and the confidentiality of patient's results was stressed.

Selected readings for session three included:-

1 De Cock K.M, Selik R.M, Soro B, Gayle H, Colebunders R.L. AIDS surveillance in Africa: a reappraisal of case definitions. Br. Med. J. 303 1185-1188, 1991.

2 Friedland I.R. Prophylaxis after needlestick injuries. S. Afr. Med. J. 78 551, 1990.

3 Friedman S.Y. and Robertson B.A. HIV infection in children - prevalence and psychosocial impact. S. Afr. Med. J. 78 528-532, 1990.

4 Mets J.T. AIDS, hepatitis B, health workers and the Workmen's Compensation Act. S. Afr. Med. J. 80 171-172, 1991.

5 Sansonetti Ph. Clinical spectrum of HIV infection. Technical Review, 4, Diagnostic Pasteur, 1989.

Tutorial: the three usual modes of HIV transmission were revised, and the potential infectivity of the HIV viral particle was considered. HIV may be transmitted either as extracellular virus or as integrated proviral DNA within an infected cell.

Small-group work: each group was facilitated by a medical technologist trained in Virology. Each group was given a topic to discuss and requested to summarize their conclusions on a large sheet of flip chart paper.

The topics or questions debated included:-

1. Can I catch AIDS if I am in close contact with HIV-infected persons? This contact may include holding hands, hugging and kissing, staying in the same house, working together in the laboratory, or sexual intercourse.
2. Can I catch the virus if I use the same utensils and articles as an HIV-infected person? This could include eating with the same knives, forks, and spoons, drinking from the same cups, sharing the same clothes and towels, or using the same toilet.
3. Can I catch the virus if I am in contact with the body fluids of an HIV-infected person.? These fluids could include specimens of blood, salvia, urine, CSF or stool, blood for blood transfusions, or organs for organ transplants.
4 Can I catch the virus through sporting activities? Sports may include rugby, soccer, tennis, swimming, etc. The participants were free to include any other activities.

During this exercise the latest AIDS statistics were displayed. Statistics included the number of AIDS cases in

South Africa and worldwide; the estimated number of HIV-infected persons (as at July 1992 and estimated at year 2000); and the number of health-care workers infected worldwide.

Report back: At the end of the exercise all these chart papers were stuck up on the wall, and a member from each group reported back to the class, thereby generating further discussion.

Video: presented some of the current diagnostic assays for HIV antibody. Aspects of viral morphology were graphically depicted and the making of recombinant and synthetic peptide antigens explained. Test procedure, safety precautions and pipetting techniques were demonstrated.

Selected readings for this session included:-

1 Brown P. Common sexual diseases could increase spread of HIV. New Scientist 21, 6-10-90.

2 Evian C. Practices that spread the AIDS virus (HIV) and implications for the workplace, Chap 4 in "AIDS in the Workplace". Golfields Press, Halfway House, South Africa. 1991.

3 Pizzo P.A. and Butler K.M. In the vertical transmission of HIV, timing may be everything. New Eng. J. Med. 325 652-654, 1991.

4 Saunders D. and Sambo A. AIDS in Africa: the implications of economic recession and structural adjustment. Health Policy and Planning, 6 157-165, 1991.

5 Torre D, Sampietro C, Gerraro G, Zeroli C, Speranza F. Transmission of HIV-1 infection via sports injury. Lancet 335 1105, 1990.

6 Wood D. and Check W. AIDS: how real the risk? Clin. Lab. Science 1 70-75, 1988.

SESSION FIVE: LABORATORY DIAGNOSIS OF HIV INFECTION

A busy serological laboratory in Johannesburg was visited.

Demonstration: on aspects of laboratory organization, safety precautions and techniques, and the diagnostic assays used for the screening and confirmation of a patient's HIV antibody status.
The the principles of the various assays and their relative sensitivity and specificity were also explained.

Selected readings for this session included:-

1 Evian C. The HIV blood test, Chap. 3 in "AIDS in the Workplace." Goldfields Press, Halfway House, South Africa. 1991.

2 Moodie J.W. Serology of AIDS. S. Afr. J. of Continuing Med. Educ. 6 58-63, 1988.

3 Moss A.R. Predicting who will progress to AIDS. Br. J. Med. 297 1067-1067, 1988.

4 Sloand E.M, Pitt E, Chiarello R.J, Nemo G.J. HIV testing, state of the art. J. Amer. Med. Assoc. 266 2861-2866, 1991.

Lecture: An experienced researcher in the field of retrovirology debated the possible theories which try to account for the origin of AIDS, and also discussed the possibilities of a vaccine in the foreseeable future.

Tea break

Questionnaire No 2 was completed by the participants

Presentation of Certificates of Attendance (and condoms!) were presented.

Selected readings included:-

1 Brown P. AIDS vaccine "may not work" in Africa. New Scientist, 16, 20-10-91.

2 Brown P MPs investigate AIDS maverick. New Scientist, 9, 6-6-92.

3 Brown P. AIDS and the forgotten defenders. New Scientist, 42-46, 13-6-92.

4 Gorman C. Invincible AIDS. Time, 3-8-92.

5 McClure M. Where did the AIDS virus come from? New Scientist, 54-57, 30-6-90.

6 Schild G.C. and Minor P.D. Modern vaccines: HIV and AIDS; challenges and progress. The Lancet 335 1081-1084,5-5-90.

7 Walsh J. The silent bomb. Time 31-33, 3-8-92.

8 Brown P. How does HIV cause AIDS? New Scientist, 31-35, 18-7-92.

ANNEXURE F

ANSWERS TO OPEN-ENDED QUESTIONS

Answers were transcribed directly from the questionnaires

Answers from all the 40 participating medical technologists are given, although, as previously stated, two of the more senior medical technologists were excluded from the statistical analysis.

ANSWERS TO OPEN-ENDED QUESTIONS

Question No 13 [Questionnaire 2]
How has your new understanding of AIDS/HIV infection affected your attitude towards practicing laboratory safety precautions?

. take more care in the laboratory..... 3
. safety was adequate already, so nothing has changed..... 2
. indefinite statement..... 1
. no answer..... 0

Responses of Group 1:-

ID	Score	Response
01:	[3]	I'm now more careful than before, I handle all specimens, especially blood, as positive to avoid possibility of infection
02:	[3]	It has encouraged me to be more careful other than be more afraid of catching HIV infection in the lab.
03:	[3]	I am going to observe laboratory safety precaution intensively
04:	[3]	The lessons made me to be conscious of the HIV virus and treat every specimen as though it is infected with the virus
05:	[3]	Stimulated me to be more careful
06:	[3]	That now I must really take safety precautions more seriously
07:	[1]	so much
08:	[3]	To be very careful and take <u>all</u> precautions
09:	[3]	More careful and shivers when another lab worker does not carry out the safety precautions
10:	[3]	To handle each and every specimen that arrives at the lab as infectious
11:	[3]	I must always exercise lab safety
12:	[3]	I have to be more careful and wear gloves
13:	[3]	Wearing gloves, lab....
14:	[3]	It is in fact scary to realize that with the least negligence one may contract the disease
15:	[3]	Made me more careful
16:	[3]	More alert about the safety environment in the laboratory as well as specimen processing safety techniques
17:	[0]	.....
41:	[3]	I am more careful now, I put my gloves on everytime

Responses of Group 2:-

18:	[3]	treat all specimens as potential infectious hazardous material and take necessary precautions
19:	[0]	....
20:	[3]	positively because I apply precautions where necessary
21:	[3]	it had made me to be more careful and take more precautions
22:	[0]	...

Question No 13 [Questionnaire 2] continued

23: [3] it makes me more cautious and I think serious safety precautions should be fully practiced in all medical lab respectfully
24: [3] to be more careful when handling any specimen
25: [3] it made me to be more attentive and concentrate so that I can be more cautious and follow every instructions tabled
26: [3] it have affected a lot, and I will start taking all specimen as infectious
27: [3] I think I will take laboratory safety precautions more seriously
28: [3] my new understanding has taught me t t all specimens are infectious and should be handled der very safety precautions
29: [33 by telling myself that as from now on I'm not going to handle any specimen without wearing gloves
30: [3] I am more cautious
31: [3] it has changed my attitude altogether, now I more carefully than before and treating each and every specimen as hazard
32: [3] changed my attitude. I will be more carefull
33: [3] attentively
34: [3] it has made to be be more catious and take all lab safety procedure and not to be afraid of handling specimens.
35: [3] do laboratory safety precautions, talk about AIDS with friends
36: [3] I am more safety-concious than ever before
37: [2] it has not affected me because safety in the lab is one of the first thing to be done
38: [3] taking stricter precautions measures
39: [3] to take more care when handling specimens

Question No 25 iii:
If the infected medical technologist did continue working in the laboratory, what sort of work should this person do?

. same duties..... 3
. change duties..... 2
. terminate services..... 1
. no answer..... 0

Pre- and postcourse responses of Group 1:

ID	Score	Response
01	[2]	in the reception
01	[3]	The very work he/she used to do as long as he works carefully following safety precautions not to infect his fellow workers and as the chances are very low in the laboratory as long as you are careful I don't think there is a problem.
02	[3]	Any kind of work as long as s/he cannot pierce him/herself with any instrument and contaminate specimens so that they'll be false positive.
02	[3]	Normal laboratory work
03	[2]	Porter
03	[2]	Recording information, the person should do writing work than performing actual tests.
04	[3]	I think s/he should continue with the normal routine laboratory work.
04	[3]	The patient should carry out all the normal duties of the laboratory
05	[3]	The same work s/he did
05	[3]	The same work he did before infection
06	[3]	Continue with his/her routine work
06	[3]	All what she/he was doing before ie to continue with routine work
07	[3]	The same as before
07	[3]	The same as he was doing before
08	[3]	Continue with normal duties, as before, but with extra precautionary measures.
08	[3]	Continue with the same work but must be more careful and cautious
09	[3]	Diagnostic work or the work that the medical technologist was doing, [if the technologist wants to]
09	[2]	Where there is no possible way of contacting people with cuts or open wounds. S/he must also keep the skin intact, no bleeding in the lablaboratory.
10	[0]	
10	[3]	He or she must do the work that he/she used to do before he/she was infected and take good consideration of lab safety precautions.
11	[3]	Should continue doing his or her work in the lab
11	[2]	He should do the work that will prevent him from transmitting the disease to patient's specimens, or his colleagues.
12	[3]	normal work as before
12	[3]	normal work that he was doing before, but always covering his cuts

Question No 25 iii: [continued]

13 [3] any type of work, they should be treated like any normal being and not as outcast
13 [2] The work that can not cause cuts so as to infect others.
14 [3] should do any work of a medical technologist
14 [3] should continue doing the same type of work for as long as he does not put other workers at risk
15 [0]
15 [2] some medically related work so as not to waste training and also still give satisfaction
16 [0] not sure
16 [2] He should do the sort of work where he will not be able to contaminate the specimens which could infect his colleagues.
17 [3] usual work that he was doing
17 [3] normal routine work and take usual safty precotions taken in the lab
41 [3] writting forms, results. The normal laboratory work usually done (esp. in Chem Path)
41 [3] Any kind of work as long as he/she will not injure himself/herself so that there will be a break in his/her skin.

Pre- and postcourse responses of Group 2

18 [3] He/she should work normally like before
18 [3] normal laboratory work ie work described in medical technologist dutysheet
19 [3] all work described in med tech duty sheet
19 [3] technologist should do normal routine work that he was doing
20 [2] process all high risk specimen in the lab and outside the lab he can work for any department which is not in direct (contact?) with the society as such
20 [2] not directly with lab personnel or patient
21 [3] He/she should continue doing the routine work as previous, because I do not think that she/he may be having any effect to the colleagues
21 [3] Her/his normal routine work
22 [2] because there are many organisms (infectious organisms) I think this person should not work because he/she is immunosuppressed
22 [1] He/she should not work or come to the lab. He/she'll be immunosuppressed and may contact opportunistic infections.
23 [2] filing and reporting in laboratory work
23 [2] clerical, management work or any paper work, not diagnosis or sterility work
24 [2] entering results
24 [2] writing result or giving them by phone. Do test that the infected person may not injuire himself, with machine

25 [3] any laboratory work, as long as that person takes precaution not to expose others to AIDS
25 [3] Every kind of work done in that particular laboratory. Because the chances of him affecting the results of the patients specimen are remote
26 [3] the normal work he or she used to do, without any discrimination
26 [3] the same as he or she used to do
27 [3] his/her usual work
27 [3] usuall work
28 [3] all his/her previous duties
28 [3] all his/her previous duties
29 [3] I should think he must continue with the work he was doing before contacting HIV/AIDS virus
29 [3] I think he must continue with the work he/she was doing before 'cause she is not in direct contact with the patient anyway
30 [3] usual work
30 [3] normal work, since he or she is not working with patients.
31 [3] same as before
31 [3] same work as he used to do
32 [3] usual work she did
32 [2] administrative work or supervisory work
33 [3] perform work he was employed for
33 [2] clerical
34 [3] everything in the laboratory because AIDS is a sexual transmitted disease
34 [3] that person should work just like others and do everything in the lab because you cant be infected with AIDS when somebody sneezes, touching and useing same cup of tea.
35 [3] same job
35 [3] same job as he/she was doing before
36 [2] any work so long the technologist is not at risk of bleeding thereby increasing chances of transmission
36 [2] any work that doesn't pose any risk of the technologist to bleed, preferably clerical work - NO STAPLES!!!
37 [3] the work of a medical technologist
37 [3] the work of a medical technologist
38 [3] normal work
38 [3] normal daily work at bench
39 [3] normal work - no difference
39 [3] normal routine technology

Question No 27 [Questionnaire No 2]:
How has your new knowledge of AIDS/HIV infection affected your way of life?
. more care at work and home, talk to others.....3
. act with more responsibility concerning sex.....2
. feel threatened.....1
. no answer.....0

Postcourse responses of Group 1:

ID	Score	Response
01	[3]	seeing that there are possibilities of being infected, I should be more careful than before not only at job situation but even at home or anywhere
02	[3+2]	to be careful with the people/person I am involved with and to treat any person as able to transmit HIV
03	[0]	.....
04	[2]	the lesson has conscientised me sepecially on the field of my sexual life
05	[3]	to be more careful with specimens
06	[3]	that I must be more cautious about my social life and work life
07	[3]	in working carefully, taking all measures of safety
08	[3]	to be more careful in lab. Talk and try to teach more people about AIDS
09	[0]	...
10	[0]	...
11	[3]	to exercise safety precaution at work and at home
12	[0]	...
13	[3]	I'll have to consider safe habits at work mostly
14	[1]	the place of work has now become more of a health hazard than a place for making a livelihood.
15	[0]	...
16	[0]	...
17	[0]	...
41	[3]	I am more careful when working with all kinds of specimens.

Postcourse responses of Group 2

18	[2]	take precautionary matters if I'm not sure of my partner's sexual activities
19	[3]	I am trying to practice safety precautions and even my lifestyle
20	[2]	try to stick to one partner
21	[3]	I have started to stick on precautions
22	[0]	...
23	[0]	...

24	[3]	I have learned that HIV/AIDS can be contacted through many things like sport, so it has taught me to be precautious because you will never know how (who?) has or not
25	[3]	No longer take things for granted, like sexual behaviour, covering cuts in my body and avoid playing sports which are too physical
26	[2]	going to be more careful more expecialy when coming to sexual partners
27	[2]	I will use condoms and try to practice safe sex
28	[2+3]	I am now practising safe sex and taking all specimen as infectious
29	[2]	by telling myself that from now on I'm going to resort to "safe sex"
30	[0]	...
31	[2]	Motto: better the devil I know then the one I don't know although I am not sure whether he has HIV or not
32	[0]	...
33	[2]	practice safe sex
34	[3]	it has made me to feel very strong even if I can be infected I knew what to expect and also to take precautions
35	[0]	...
36	[0]	...
37	[0]	...
38	[3]	being more careful handling specimen, changing sex life and be just more careful
39	[0]	...

Question 29:
How do you think AIDS awareness among medical technologists could be increased?

. through education.....3
. by seeing patients who have AIDS.....2
. by stressing safety precautions in the laboratory.....1
. no answer.....0

Pre- and postcourse responses of Group 1

ID	Score	Response
01	[3]	by medical literature or by having lectures, and attending seminars particularly when AIDS is discussed.
01	[3]	Most definitely, we need to be reminded now and then
02	[3]	An AIDS programme like this one is more than good
02	[3]	By holding seminars, courses like this one, so that the most recent findings and progressing on HIV can be imparted to others
03	[3]	By educational programmes
03	[3]	Every bench should have a poster indication how deadly the disease is to remind people.
04	[3]	It could be increased if aid classes eg seminars are held
	[2]	where the relevant people addresses the meeting, and visiting the patients could be of help because one can get more information on how do the patients feel (regarding pain)
04	[3]	By holding as many symposiums as possible on aids and by showing video related cases and news update on recent findings/investigations
05	[3]	By educational programmes
05	[3]	By educational programmes
06	[1]	Having AIDS warning signs all over the lab and corridors a[illegible]
	[3]	precautions that must be taken, also monthly distribution of pamphlets warning about AIDS
06	[1]	Posters to be on walls,
	[3]	to be informed about the latest development of AIDS now and then.
07	[3]	By establishing lectures and discussions among themselves
07	[3]	By organizing symposium and offering some present for increasing participation of others believe that it is a myth.
08	[3]	More educational talks and seminars and talks/visits from people in the field of interest
08	[3]	More enlightenment on the subject, more group discussions during breaks, sharing of ideas.
09	[3]	Talking about the virus/disease - courses or symposium.
	[1]	Stress safety precautions.
09	[3]	AIDS courses - talk among themselves about the disease.

Question 29: [continued]

10 [3] By educating them
10 [3] By educating them and
[1] inform them about the importance of lab safety precautions.
11 [3] By having or conducting seminars and discuss about AIDS among medical technologists.
11 [3] Always talk about AIDS or organise seminars or classes.
12 [3] by introducing lectures
12 [3] by having lectures and courses
13 [3] formal and informal talks about the disease should be hold regurlaly (AIDS symposium)
13 [3] seminar should be hold very often
14 [3] appropriate placcards about AIDS awareness and frequent lectures about the dangers of AIDS
14 [3] AIDS posters should be put at all entrances to laboratories
15 [3] information, courses like this one, readings and discussions
15 [3] communication, lectures, simposiums
16 [3] by forming AIDS jurnal clubs
16 [3] regular updates on the statistics, local, national and global, and the bleakness of future at the moment as far as finding a cure, protection is concerned.
17 [0] yes
17 [3] reglar AIDS symposium
41 [3] by journals and courses like this one and holding seminars on AIDS
41 [3] by attending AIDS courses like this one.

Pre- and postcourse responses of Group 2

18 [3] It could be increased by introducing something like this aids course
18 [3] Attending courses and including in sillabus while at the technikon
19 [3] be included in syllabus while at the technikon
19 [3] it could be increased by doing such a course like what we are doing about aids awareness
20 [2] showing the workers and informing them about HIV infected patient
20 [2] tracing the history of infected patient, showing them infected patient
21 [3] by having lectures as 1992 and coming together in the form of discusion
21 [0] yes
22 [3] discussing about AIDS, having lectures;
[2] by visiting patients with AIDS and asking them how the feel - or looking at their physical appearance
22 [2] by arranging visits to the wards with AIDS patients
23 [3] by teaching and distributing information leaflets among laboratories
23 [3] I think by teaching, looking at HIV recent video tape or doing the same HIV course every year

Question 29: [continued]

24 [3] education
24 [3] by giving Aids education among our selves
25 [3] by holding Aids seminars, videos,
[2] visiting institutions where infected people live
25 [2] exposing them to the figures of HIV+ people and the patients who are at terminal stage from illnesses associated with Aids
26 [3] by having discussion with other medical technologists and student of different institutions to make this more interesting and attracting
26 [3] by holding symposiums regularly
27 [3] by introducing more Aids awareness courses
27 [3] by holding more seminars and aids awareness courses like this one
28 [3] by arranging some educational programmes on the subject itself whereby people will be taught thoroughly about Aids
28 [3] by conducting tutorial sessions with them now and then
29 [3] by holding seminars where medical technologists can be briefed about Aids
29 [3] Yes because there are few who still don't believe that Aids is here to stay
30 [3] increasing their knowledge
30 [3] using the jeornal or any other media
31 [3] by teaching us that is offering courses like this one and let them be compulsory
31 [3] by offering such courses as frequently as possible to keep everybody updated and let them be compulsory
32 [3] holding courses like this one
32 [3] by holding educational sessions like this one
33 [3] by holding aids seminars and frequent attendance of journal clubs
33 [3] by holding frequent Aids courses
34 [2] Departmental heads should at least once a month call a meeting about safety precaution in the lab
34 [3] This course is very interesting I think it should continue and teach other medical technologists
35 [3] by organizing seminars
35 [3] by organising symposium
36 [3] regular seminars on the subject, shocking pictures about aids on the walls, encouragement twoards attending conferences/congresses dealing with Aids.
36 [3] by weekly updates of statistics of HIV positive findings, particularly of those near their work/home
37 [3] let them have lectures and seminars
37 [3] by holding regular courses like this one and also seminars
38 [3] to be given some lectures on Aids and
[2] how to deal with specimens
38 [3] to be given courses and lectures on Aids
39 [3] increased knowledge
39 [3] more discussion groups, reading

Question 30: Questionnaire No 1:
Is there anything that you particularly want to know about AIDS?

. all about the virus, its pathology and transmission.....3
. whether there is a cure and/or vaccine.....2
. about laboratory diagnosis, patient counselling and costs..1
. that AIDS is a myth or no answer.....0

Question 30: Questionnaire No 2:
Was there anything that you particularly wanted to know about AIDS/HIV infection that was not dealt with in the course?

. everything was covered.....3
. costs of laboratory tests and patient care.....2
. or no answer.....0

Pre- and postcourse responses of Gro

ID	Score	Response
01	[3]	how are these viruses transmitted during sexual intercors. because I thought they are found mostly in blood, how come that the large amount found in semen, and how does a female transm.t them?
01	[3]	not really
02	[0]	tell me that the AIDS thing is just an imagination, that it does not exist
02	[3]	no
03	[3&2]	recent information about a cure for AIDS. How was it discovered that HIV is not necessarily a causative for AIDS? There should be another virus?
03	[3]	I don't think so
04	[3]	Yes, the possiblity of getting infected during open-mouth kissing and close physical contact with the aids patient.
04	[3]	The course has covered almost all my questions about AIDS even more than I expected. I appreciate all the efforts taken to update us.
05	[3]	What other factors are needed together with HIV to develop AIDS
05	[3]	No
06	[2]	discovery of vaccine
06	[3]	no, I think I have learned most
07	[0]	yes
07	[3]	certainly no
08	[1]	correct counselling of a person tested HIV postive
08	[0]	...
09	[3]	to be clear on origin and transmission
09	[3]	not really
10	[0]	yes
10	[3]	no

Question 30: [continued]

11	[3]	I want to know everything
11	[3]	no
12	[2]	vaccines
12	[3]	none
13	[2]	how far is the research of its treatment is by now
13	[3]	no
14	[2]	the possibility of finding a cure or the ability to control the disease
14	[3]	not that I can think of
15	[3]	as I know virtually nothing - lots
15	[3]	no
16	[3]	everything about AIDS
16	[1]	the cost of treating aids patients, and cost of aids research
17	[3]	clinical diagnosis, as well as laboratory tests and their validity, reliability and statistics
17	[0]	...
41	[3]	no, I want to know everything about it
41	[3]	so far, I think I was covered

Pre- and postcourse responses of Group 2:

18	[2]	a lot ie how does it affects our lives families and friend; the cure and how can it be transmitted
18	[3]	Not at this moment
19	[2]	the possibility of a vaccine in the near future
19	[3]	no
20	[3]	yes, to which extend can it be transmitted with clear defined boundaries
20	[2]	yes, patient who can tolerate the virus
21	[0]	not sure
21	[3]	no
22	[3]	its cause
22	[3]	no
23	[3]	how does it suppress immune response (mechanism of attracting the lymphocytes) not the blood cells.
23	[0]	...
24	[0]	...
24	[3]	no
25	[3]	yes, the chances of an HIV infected individual to develop full blown AIDS. Whether any sexual contact will always result in infection
25	[3]	no
26	[0]	not really
26	[3]	no
27	[3]	everything
27	[3]	no
28	[3]	the ability of the virus to suppress the body mechanisms (defence mechanisms)
28	[3]	no

Question 30: [continued]

29	[3]	I would like to know if mosquito bites can really transmit HIV virus
29	[3]	not up to so far
30	[0]	yes
30	[1]	yes, the safety of the methods used by blood transfusion lab
31	[0]	not much
31	[3]	no
32	[3]	I want to know everything about AIDS
32	[3]	no
33	[3]	everything possible
33	[3]	no
34	[3]	I want to know how it is replicated, attack the immune system and how to prevent it to multiply
34	[3]	This course has covered a lot of scope I'm still going to read the note we were given then open a small school for AIDS education in my township
35	[0]	yes
35	[3]	no
36	[3]	yes, its origin
36	[0]	not so sure
37	[0]	...
37	[3]	no
38	[0]	not sure
38	[0]	...
39	[0]	no
39	[3]	no

ANSWERS TO OPEN-ENDED QUESTIONS

Question 38:
Why do you think that it is important for you to know about AIDS/HIV?

. to educate others about the disease.....3
. to protect oneself from the disease.....2
. to be able to deal with people with AIDS.....1
. no answer.....0

Pre- and postcourse responses of Group 1

ID	Score	Response
01	[3+2]	I want to know more about it so as help others as well as myself
01	[3]	So that I can help others who are not well versed with this, so that they can help others.
02	[2]	Maybe I can do something about it - someday
02	[3+2]	So that I can educate others, and so that I can be careful not to catch HIV infection.
03	[2]	It has become such a threat to the society. I would like to know much on how to prevent [protect?] ourselves
03	[2]	Because I wouldn't like to contract the virus.
04	[3+1]	I must be able to react to situations where I might find myself in the company of the "aids" patients and again what to say if somebody asks me about AIDS
04	[2]	AIDS is a terrible disease which can lead to a very painful death and at the moment it is incurable [no medicine]
05	[3+2]	Responsibility to myself, family and friends
05	[2]	To protect myself, family and friends.
06	[2]	It is the most devastating disease - it is incurable, once a sufferer - next is death.
06	[2]	Because it is a deadly disease, a killer disease with no vaccine.
07	[3+2]	For my own benefit and the community at large, giving correct and relevant information
07	[3+2]	For my own protection, for my family and community
08	[3]	To educate others, as well as help and understand people involved.
08	[3]	To educate others
09	[3]	To be able to tell people about HIV and AIDS and understand what I am saying
09	[3]	What makes it so special that the antibodies against it don't mean that one is immune to the virus.
10	[3]	So that I can know about it and be able to educate others to minimize the disease.
10	[3]	To educate others so that the risk of catching AIDS is minimized
11	[3]	Because as a health-worker I have the responsibility to share my knowledge with the community.
11	[3+2]	Since there is yet no cure for AIDS, it is important for me to prevent the disease. Or teach other people about AIDS

Question 38: [continued]

12 [3] to explain clearly to my family and friends
12 [3] to be able to explain to other people
13 [3] the best for now is to know about it so as to educate others not to spread it
13 [2] to protect myself in future
14 [3] to be able to help wherever possible in the community and friends about preventing the disease
14 [3] it is important so that I can educate colleagues and members of my community.
15 [2] I think it is important for everybody to know more about AIDS as this is our only protection
15 [3+2] to protect myself, to inform others - friends, relatives etc
16 [2+3] because we handlo specimens from people who might have AIDS, and to answer questions when asked.
16 [3] in order to make others aware of it
17 [3+2] in order to take due care in specimen handling and to educate others
17 [3+2] because we interrelate with others, to be able to teach others.
41 [3+2] because I can avoid being infected and also help others to understand and avoid being infected.
41 [2] so that I can be more careful in whatever I do

Pre- and postcourse responses of Group 2

18 [2] because it concern our lives - serious disease which kills anyone
18 [2] knowledge leads to prevention which is always better than cure
19 [2] in order to take preventative measures
19 [2] because IDS is a killing disease and at this point in time there is no vaccine in curing the disease
20 [2] so that we can prevent or minimise the risk of infecting ourselves
20 [2] because is affecting everybody
21 [3] for having knowledge to advice friends, family, collegues and others
21 [3] to tell friends, family and collegues
22 [0] ...
22 [0] ...
23 [3+2] because I want to know why it is suppressing the immune system, where it comes from and why suddenly is killing people on this century or decade
23 [2] because HIV is killing people and nobody is safe against HIV and secondly its antibody does not immunise the people.
24 [2] because the disease is very dangerous and it spread so quick to infect many people
24 [2] because AID is a spreading disease and it kills. It doesn't matter who you are, you can be infected.

Question 38: [continued]

25	[3]	to educate other peoplle, to avoid infection, to advise others who are not well informed.
25	[3]	as the member of the community, I think there is contribution I can make to prevent it from spreading.
26	[2+3]	so that I can avoid to be infected, and educate others.
26	[2+3]	so as to take care about myself and to educate more people.
27	[2]	it a reality and very deadly
27	[2]	because it is deadly
28	[2]	to limit the escalation of deaths due to AIDS
28	[2]	to limit the number of deaths due to this virus
29	[3]	so that I can share views with my family, friends and colleaques
29	[2]	to minimise the number of AIDS cases as I will spread the gospel to those who are in the dark
30	[3+2]	to protect myself and people around me
30	[2]	my protection and people surrounding me
31	[3+2]	firstly it is for our own benefit and also for the community as medical proffesionals we ought to have answers for their questions
31	[2]	firstly it is for my own good, to my family, to my friends and to the community as such
32	[3]	to can tell others
32	[3]	to teach other people about it, like friends, family members and school children
33	[2]	cause its the most devastating and prevailing disease around
33	[2]	there is no vaccine so far and one should know a lot about HIV and precautions related to it.
34	[3+2]	so as to inform the community how to take of themselves and prevent the spread of AIDS
34	[3+2]	it very important because I will have a quality of life not to sleep around take safety procedures at my work place and also to tell others
35	[3]	to take necossary step to help the public to be aware of AIDS to help slowing down the spread of the disease
35	[2]	to become aware and take the neccesary prevention steps
36	[2+3]	to be able to give adequate explanation to people who never had the opportunity to learn about AIDS, and also for self-protection
36	[1]	who has AIDS
37	[3]	to be able to understand reality of this disease and its developments in curing it
37	[2]	because I deal with specimens from patients that can be having aids
38	[2]	averything about AIDS like the spreding, means of infection, prevention of attracting the disease etc
38	[2]	because it is a dreadful disease for which there is no cure and it is fatal
39	[0]	...
39	[0]	...

Question 48:
Can you suggest (at least two ways) how the safety precautions used in your laboratory can be improved?

Pre- and postcourse responses of Group 1

ID	Score	Response
01	[2]	If we can be careful when working it can help and reduce chances of being infected.
01	[4]	The usage of surgitex gloves not unsterile ones Usage of better disinfectants, not 70% alcohol only
02	[2]	We must wear masks and needles shouldn't be used for blood collection
02	[2]	Gloves, masks [facial]
03	[2]	Staff members should be encouraged to wear gloves at all times while handling specimens.
03	[0]	...
04	[0]	...
04	[0]	...
05	[0]	...
05	[2]	By incineration in the dumping place
06	[2]	To see to it that everybody adheres to precautions eg no one to be allowed to work without gloves, if caught to be strongly warned.
06	[0]	...
07	[2]	Handling every specimen with gloves on
07	[4]	Handle all specimens with safety and wipe bench before working and after.
08	[2]	Easily available chemicals to wash with immediately in the case of an accidental needleprick experience
08	[2]	Masks and chemical application in case of accidents.
09	[2]	Wear gloves and masks full time when touching specimens
09	[2]	Everybody must do what he says/tell others. Treat every specimen as infectious.
10	[2]	The syringes that are not capped must not be accepted
10	[4]	Instead of using 70% alcohol, formalin must be used Surgical rubber gloves must always be available.
11	[0]	...
11	[4]	Wearing of gloves, coats, and masks Correct disposal of specimens.
12	[2]	by wearing clean coats
12	[4]	wear gloves, wear masks
13	[0]	it is fine for now
13	[2]	order more disinfectant used eg in Virology, and not 70% alcohol
14	[2]	every specimen should be handled as if it is capable of transmitting AIDS
14	[4]	1 - technologists should be extra careful and wear gloves all the time 2 - AIDS update courses to be given

Question 48: [continued]

15 [4] stricter supervision - marking of speciments as ?HIV
15 [4] stricter supervision, more regular cleaning of bench
16 [0] ...
16 [4] always wear gloves when working with specimens. Treat specimens with care, as if they are fully infectious
17 [2] improvement of specimen handling techniques
17 [2] mark the symptomatic specimens
41 [2] masks, gloves and special places [cupboards]
41 [2] finding better ways of getting rid of waste material

Pre- and postcourse responses of Group 2

18 [2] by compulsory wearing of gloves all the time while working with specimens
18 [2] forced everyone to wear gloves and masks at all times
19 [2] stop collecting specimens in needles, rather transfer from syringe into bottle after sampling
19 [0] ...
20 [2] reducing work load and work at specific times
20 [2] the only way is to let them aware of the routes of infection
21 [2] immunisation
21 [2] vacination
22 [2] by supplying extra protective clothing like leather boots, long length protective clothes
22 [2] extra protective clothes
23 [0] ...
23 [2] wearing face masks every, no playing, laughing
24 [0] ...
24 [2] any specimen send to the lab be highlyted
25 [2] avoiding using syringes connected the needles
25 [2] improve work conditions and supervise the workload
26 [2] by having specimen properly indicating infectious specimens
26 [2] specimen of HIV should be stored and analyse separately and there should be a clear marking for such samples
27 [0] not sure
27 [2] full time wearing of gloves when working with specimens, treatment of s ens as potentially harzardous
28 [2] supply of sufficient gloves a by correct specimen containers
28 [4] protective clothing; disposal of all equipment and containers which came into contact with the specimens
29 [2] by making sure that every specimen is fixed in formalin
29 [0] ...
30 [2] all specimens be regarded as harzadous
30 [2] glove and face masks all the time
31 [0] ...
31 [2] wearing of gloves must taken as a rule

Question 48: [continued]

32	[0]	...
32	[0]	...
33	[4]	HIV laboratory to be isolated from other departments and be heavily equiped with its only working instruments
33	[4]	isolate HIV testing lab purchase instruments that could help technologist not to in contact with blood often
34	[2]	if the needle from astrup sample can be removed and use the other stoppers
34	[2]	wear gloves
35	[2]	to have Aids safety precaution committee
35	[4]	treat all specimens as infectious agent; wear gloves, gown, gogles and clean our benches
36	[2]	wearing protective clothing/materials at all times
36	[4]	availing all safety clothing at all times, holding seminars on safety
37	[0]	...
37	[0]	...
38	[2]	make more use of disp. gloves, by taking more and better precautions
38	[2]	wearing of disposable gloves more regularly
39	[0]	...
39	[0]	...

ANSWERS TO OPEN-ENDED QUESTIONS

Question 59: Questionnaire No 2 only
Do you have any suggestions that could improve future courses?

Postcourse responses of Group 1

ID	Response
01	To have more videos and be shown more seriously infected patients.
02	...
03	Tea breaks was a good idea!
04	I approve the way in which this course has been conducted and I will appreciate it if other future courses will take this example.
05	Being able to look at the virus under EM
06	To involve more practical cases eg to even see patients suffering from AIDS
07	1 More discussion than teaching 2 presentation of all participants.
08	If possible, to get an AIDS sufferer to talk to people, so that they do know that there is a disease like AIDS, and puts their fears of physical contact at rest
09	Anyone who is interested should be invited may run a course for a whole day or two, just for the awareness of people.
10	No
11	No
12	...
13	it was fine
14	more visual material from case studies
15	shorter session and more sessions
16	these courses should be held at least twice a year
17	..
41	letting people know in time that there's going to be such a course and putting as many notices as possible

Postcourse responses of Group 2

18	advertise the course for everyone to know since I heard about this couse by chance
19	Aids course should also be extended to school children and people who are not health workers
20	each student must be given time to express himself verbally eg by giving a lecture to read his knowledge
21	I think that all medical technologists voluntarily should go in schools and collages to give light (inform) and insists main precautions to be taken (Aids teaching)
22	Yes, I think seeing the patients could also improve future courses
23	...
24	...

Question 59: Questionnaire No 2 only continued

25 no
26 by meeting with other institutions and discuss the lessons with had
27 no
28 the talking with Aids patients personally and share some ideas with them
29 no suggestion up to so far
30 ...
31 ...
32 no
33 ...
34 I do suggest that after each session a test should be written and it must not be a secret
35 try and invite voluntary patient who are HIV positive to hear from them
36 hands on practice of screening tests
37 not now
38 more lectures on the topic
39 ...

ANNEXURE G

CERTIFICATE OF ATTENDANCE

Continuing education for Medical Technologists

This is to certify that

MR E MOGOREGI

has completed a scientific educational programme on

AIDS



⊛ 17-25th August 1992

Signed

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